NBSIR 73-172

Standardization and Measurement Services in Turkey

A Report of a National Bureau of Standards/Agency for International Development Survey
Conducted October 14–28, 1972

A Report of a Survey Conducted jointly by the National Bureau of Standards
and the Agency for International Development.

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U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

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(A Report of an National Bureau of Standards/Agency for International Development Survey Conducted October 14-28, 1972)

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U. S. DEPARTMENT OF COMMERCE, Frederick B. Dent, Secretary

NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director

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The encouragement, planning assistance and generous financial support from the U.S. Agency of International Development, U.S. Department of State are gratefully acknowledged. In addition the Team sincerely thanks the numerous unnamed government, industry and university colleagues in Turkey who gave freely of their time and advice to assist the Survey. Dr. E. L. Brady and Dr. G. Nichols read the typescript with great care and made numerous suggestions. Mrs. M. L. Keeney gave editorial assistance.

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I. Purpose of the Survey

The purpose of the NBS-AID Survey was to study and assess standardization in Turkey, with special attention to its role in supporting Turkish goals of industrialization.

The NBS/AID Survey team was specifically invited by the President of the Turkish Standards Institution (TSE), Prof. Dr. Tarik G. Somer, to carry out this study. Accordingly the team concentrated its attention on (a) technical functions for which TSE is responsible, (b) those in which TSE is presently involved, and (c) those which are presently not adequately available as services in Turkey. With regard to (c), the team considered whether and how TSE might be involved for national benefit and as an institutional opportunity.

Thus some of the aspects relevant to the Survey were:

(i) National goals related to the scope of the Survey;

(ii) Applied research capability;

(iii) Industrial, governmental, and university cooperation and support

(iv) Standardization capabilities;

(v) Testing facilities;

(vi) Calibration services;

(vii) Industrial extension services;

(viii) Product quality control;

(ix) Training in use of standards;

(x) Consumer protection.

II. Conclusions and Recommendations

A. Conclusions

1. The Turkish Standards Institution (TSE) is an extremely valuable tool in the continued industrialization of modern Turkey. Since Turkey advantageously obtains much of its technology from joint ventures with industrial firms of other nations, many of its needs for standards and quality control procedures are satisfied by the parent

firms. However, for more than a decade, critical needs for original standards and for standards adjusted to suit local conditions and in support of self-reliant Turkish ventures have been identified and provided by the dedicated and competent staff of TSE.

2. The Survey Team foresees that demands made upon TSE for standards and other services, already taxing TSE's present resources, will continue to increase. If TSE is to meet its challenges adequately and to seize the opportunities to aid Turkey's burgeoning industry that abound in many areas, its capabilities must be increased. This will undoubtedly require major changes in funding, staffing, and organizational productivity. The Can Committee,* appointed to study these matters, is preparing recommendations for operating improvements; from what it has learned of these recommendations, the survey team believes that implementation of the recommendations will aid TSE considerably in accomplishing its mission.

3. TSE's central facilities are well-designed and maintained, but seem capable of greater utilization.

4. TSE was conceived as a centralized national standardizing body. The single facility in Ankara derives both advantages and disadvantages from its location. Its proximity to other government establishments and to quality educational institutions and its central geographic location relative to Turkish industries are undeniable assets, but its distance from major centers of Turkish industrial activity is a source of operational difficulties and of obstacles to communication with many of its potential users.

5. Needs for increased availability of TSE laboratory services and for the preparation of standards for additional materials and products were frequently reported to the team in its visits. However, the team found that quantitative data to support such demands are sparse. This remark is not intended to imply that the needs do not exist, but merely to indicate that the basis for decisions on allocation of resources needs strengthening by means of surveys in depth, economic and technological predictions, and the like.

6. TSE appears to have excellent close relationships with colleges and universities in Turkey. Cooperation between faculties of universities and TSE management seemed excellent, and university faculty members serve on many TSE committees of experts. Similarly, industrialists and their professional employees are frequent

* A Turkish committee established to advise on the administrative structure and technical procedures of TSE. The Committee was chaired by Prof. Fahrettin Can of the Middle East Technical University.

participants in TSE activities. Collaborative relationships that seemed most in need of strengthening were those with government agencies and their technical branches.

7. TSE has developed effective liaison with international standards organizations; it is an important participant in ISO and IEC activities, and TSE officials have held major positions in these organizations.

8. The legislation that established TSE provides a stable base for the institution but perhaps does not allow sufficient operating flexibility. The unambiguous delegation of standards responsibility given to TSE by the legislation provides essential authorities. Unfortunately, the specific organizational structure and methods of raising income specified by the legislation reduce the options available to the TSE management for exercising initiative and innovative administrative improvements. Ultimately serious consideration might be given to possible ways of removing some of these managerial inhibitions.

9. The contributions of TSE to the Turkish economy are not widely recognized by the general population. Thus the incentive to manufacturers to use TSE standards and quality marks is not strong since the manufacturers tend to believe that other quality designations (e.g. their own brand names or trade marks) may be more highly regarded as indications of quality than the TSE designation.

10. The survey team endorses the concept of the TSE mark of excellence. Supervision in the use of the mark at the factory level may need strengthening, and the criteria and priorities for the use of the mark throughout industry should be reexamined.

11. In its review of the basic metrology services that are now or might in the future be provided by TSE, the survey team concluded that the economy of Turkey has a limited need at present for a comprehensive and sophisticated basic metrology resource. Calibration services provided from abroad together with judicious expansion of TSE's calibration services may be adequate to meet present requirements. However, as the level of sophistication of Turkish manufacturers continues to rise, precision metrological services of many types will become more necessary, justifying the establishment of a centralized comprehensive instrument calibration facility.

12. TSE hopes to assume major responsibility in regulation and control of commercial weights and measures. Limited indications given to the survey team of the current state of weights and measures practices in Turkey point to a need for supporting services, including calibration, instrument maintenance, information dissemination, and

staff training. However, the team concludes that TSE should reconsider its plans to assume a major portion of the burden.

The reasons which lead the team to this conclusion are the following; (a) the basic legislative responsibility is lodged elsewhere; (b) the quality and extent of coverage of present controls are not well known; and (c) the interaction between the federal government and local governments in this field seems to need clarification. Further, the decision on which agency is to provide technical support for the weights and measures program should probably be made at the same time as the decision on the agency responsible for basic metrology because of the close relationship between these activities. When the appropriate authorities make these decisions the role of TSE will be clarified.

13. The team believes that TSE should be expected to play an important role in consumer protection. As quality and variety in consumer products increase in the market place, performance standards emphasizing safety and durability will undoubtedly be demanded in large numbers.

14. As manufacturing processes become more elaborate and more sophisticated, quality control becomes more important, especially for goods exported to foreign markets. It results in savings of resources, increased productivity, and enhanced competitiveness in international trade. Systems for surveillance and control of quality at appropriate steps in the manufacturing process have been found to be necessary in all industrialized nations. The responsibility for quality control of exported goods does not appear to rest principally with TSE. However, TSE, through application of its expertise in specifications, standards, and test methods, must be an essential element in the Turkish industrial quality control system.

15. Industrialization is accompanied by problems of ecological and environmental impact. The appropriate role for TSE in keeping these problems under control requires careful consideration. At the very least, the team believes that TSE can, in the course of its standards-making activities, identify potential sources of trouble and stimulate government concern.

16. In countries at an early stage of industrial development, technical resources in facilities and manpower are usually rather sparse and must be carefully husbanded and deployed. This often results in large numbers of diverse responsibilities being assigned to single organizations, as is evident in the structure of numerous standardizing bodies in developing economies. Turkey, however, has the resources to avoid this difficulty; considerable scientific and technological capability can be found throughout its industrial, academic, and Federal

establishments. Hence, many alternative patterns for the assignment of supporting responsibilities for the technological infrastructure can be devised, permitting highly specialized centers of competence in various fields to be developed. The survey team believes that TSE should be a highly developed center of competence in standards development and related activities (such as test development, certification schemes, quality control, etc.), and should resist temptation to dissipate its energies and resources by undertaking too wide a range of responsibilities.

B. Recommendations

The NBS/AID Survey Team makes the following recommendations for consideration by the Turkish Standards Institute and appropriate governmental and nongovernmental bodies:

1. That the contribution of the Turkish Standards Institution (TSE) to the industrialization and economic health of the Nation should be expanded by:

a. Implementation of the recommendations of the Can Committee providing increased support for the Council of Experts, in order to facilitate the production of standards and to foster the participation of the highest level of technical competence in the work of the Council;

b. Conducting a comprehensive program of public and professional education in the principles and benefits of standardization (This should include activities designed for public schools, use of mass media, and presentations to engineering and other professional societies. Familiarizing the Turkish population with the work of TSE will facilitate acceptance of the quality mark and use of TSE standards);

c. Detailed evaluation of the present enabling legislation, especially those sections dealing with financial support (Despite possible complications associated with amendment of the law, future expansion of TSE may be inhibited by its fiscal provisions unless some changes are made. Experience of other nations shows that it is extremely difficult to support an adequate standards infrastructure mainly or solely with reimbursements. Since many of the services offered or projected by TSE have broad public benefits as well as private industrial ones, they might appropriately be funded, wholly or in part, by public funds. The possibility should be considered that TSE might seek general grants from governmental or non-governmental sources, or that a government appropriation should be made for partial support);

d. Assigning to TSE, at least on an interim basis, responsibility for assessing national needs for standard reference materials and for establishing a distribution program.

e. Undertaking studies in collaboration with other organizations (such as TBTAK, the Chambers of Industry and Commerce, and the universities) of the needs for laboratory and analytical services in the principal industrial sectors of Turkey. (Studies of this nature seem to be essential in order to plan the effective deployment of TSE resources for laboratory support. The possibilities of marshalling existing facilities in the private sector, in government, and in academia to attack common problems should be explored before further investment in new laboratories is undertaken. A system of accreditation of laboratories for specific activities might be considered as part of a solution.)

f. Strengthening the capabilities of the central laboratories of TSE in accordance with the recommendations of the Can Committee. (Strengthening in some areas is probably needed in order to assure that the quality certifications and test reports obtained by TSE will be fully accepted internationally.)

2. That the roles and relationship of TSE and TBTAK should be clarified. Both organizations apparently have major roles to play in coordinating and supporting Turkish science and technology. Effective collaboration between the two is necessary to avoid duplication of effort and to maximize the efficient use of national capabilities.

3. That the status and responsibilities of TSE for standards and quality control on exported goods of all types, both manufactured and agricultural, should be clarified.

4. That a survey of product testing facilities and expertise in industrial and academic laboratories and other organizations should be conducted. This probably should be undertaken by TSE to help it fill demands for local services throughout the nation. The inventory should include an evaluation of the competence and facilities of the various laboratories, as well as their availability to undertake work for other individuals and institutions.

5. That additional opportunities for TSE staff to be trained at NBS and similar organizations should be provided. Short-term assignments of foreign consultants (from U.S. and other countries) should also be sought. The possibility of support from AID, UNDP, UNIDO, or other sources should be further explored.

III. The Survey Team

The Survey Director was Prof. Dr. Tarik G. Somer, President of the Turkish Standards Institution (TSE) and Professor of Chemical Engineering of the Middle East Technical University (METU).

Mr. Velid Isfendiyar, Secretary General of the Turkish Standards Institution (TSE) and Mr. Fuat Yucesoy, Consulting Engineer, Vice-Chairman of TSE, Mechanical Standards Preparatory Group, were the other Turkish members of the team.

The Turkish team members withdrew from participation in the writing of this report with the intention of optimizing the objectivity of opinions, conclusions or recommendations to be presented. However, they generously agreed to assist with the editorial tasks.

The remaining members of the Survey Team were as follows:

Mr. Raul Estrada
Technical Director of the Instituto Ecuatoriano de Normalizacion
Ecuador

Mr. Jeon, Byong Sik
Chief of Specification Division
Bureau of Standards
Republic of Korea

Dr. Charoen Vashrangsi (Observer)
Head of Division of Physics and Engineering
Department of Science
Ministry of Industry
Thailand

Mr. William E. Andrus
Program Manager for Engineering and Information Processing Standards
National Bureau of Standards
U.S.A.

Dr. Robert J. Corruccini
Senior Scientist
Institute for Basic Standards
National Bureau of Standards
U.S.A.

Dr. Sanford B. Newman
Senior Program Analyst
National Bureau of Standards
U.S.A.

Mr. H. Steffen Peiser (Team Leader)
Chief, Office of International Relations
National Bureau of Standards
U.S.A.

Dr. H. Thomas Yolken
Deputy Chief, Office of Standard Reference Materials
National Bureau of Standards
U.S.A.

Mr. Andrus was unable to stay in Turkey for the second of the two weeks of the survey. Mr. John Fry of the AID's Office of Science and Technology in Washington visited the Survey in Ankara for one day. He is the Director of the Program under which the Survey was partially financed.

IV. Background and Preparation for the Survey

A. Background

Leaders of every country strive to achieve a higher standard for their people, better education, sounder health and an improved quality of life. These goals are unattainable by simple exploitation of natural resources. Agricultural and manufactured products are also needed which in turn require the support of standards, calibration, and measurement and testing services. These services have been important features of all developed countries and have accompanied the industrialization process of a number of recently developed countries. Such activities may be critical elements in developing economies for control of manufacturing processes, quality control of products, encouragement of exports, and the transfer of technology from abroad.

The U.S. Agency for International Development (AID) at a very early stage recognized the importance of the Turkish Standards Institution to the economic health and growth of the country. Resources were made available for the equipping of a laboratory and the U.S. National Bureau of Standards (NBS) was approached some years ago for advice and consultation.

For this and other reasons, Turkey was a natural choice for inclusion in Phase II of an NBS/AID program of assistance to developing countries. The program was planned as a modest effort to test on a worldwide basis ways in which NBS could most effectively collaborate in the industrialization efforts of these countries. It was decided that for best results, the test programs initiated during this phase should be confined to a few carefully selected areas of the world in which effectiveness could be evaluated on the basis of essentially

experimental activities. The basic criteria used in selecting target countries were the following:

a. A developing nation currently on the AID list.

b. Willingness by the target country to invest some of its own resources, financial and other, in the effort.

c. Reasonable expectation of internal stability in the target country.

Other developing countries chosen to participate in Phase II were Korea, Ecuador and Thailand.

B. Preparation for the Survey

Although less developed countries may differ significantly from each other in their individual aspirations with respect to industrial development, many of the problems they face in establishing an effective infrastructure of measurement technology and standardization for production and quality control are similar. As a result, standardization experts in most of these countries are eager to share their experiences and to learn from each other. Phase II was planned with the intention of maximizing the potential benefits to be derived from such exchange.

Accordingly, three developing countries participating from the outset in the program (Ecuador, Turkey and Korea) were invited to send representatives to a week long standardization workshop held at the NBS site in Gaithersburg, Maryland, U.S.A.* The Workshop was designed not only to acquaint the participants with the services provided by NBS to the technical and scientific community but to allow for discussions and presentations of different institutional and organizational approaches to providing comparable services in other countries. The aspects stressed in the Workshop included:

a. Maintenance of national standards of measurement compatible with the International System of Units (SI).

b. Field surveillance of weights and measures.

c. Procedures for the development of standards (including safety, building codes and consumer protection).

* NBS Report 10901, H. Steffen Peiser, ed. "Report to AID on the NBS/AID Workshop for the Survey Team of National Capabilities for Standardization and Measurement Services in Industrializing Economies," April 23-28, 1972.

d. Inspection and quality control of production (sampling, tolerances, control charts).

The Workshop was held from April 21 to April 30, 1972. Included among the attendees were the following representatives of the three countries:

Ing. Raul Estrada
Technical Director, Ecuadorean Institute of Standards (INEN)
Quito, Ecuador

Mr. Hong, Young Pyo
Senior Mechanical Engineer
Central Bureau of Weights and Measures
Ministry of Commerce and Industry
Seoul, Korea

Mr. Velid Isfendiyar
Secretary General
Turkish Standards Institution
Ankara, Turkey

Mr. Jeon, Byong Sik
Chief of Specification Division
Bureau of Standards
Ministry of Commerce and Industry
Seoul, Korea

Mr. Luis Uresta
Engineer, Ecuadorean Institute of Standards
Quito, Ecuador

Mr. M. Fuat Yucesoy
Senior Mechanical Engineer
Turkish Standards Institution
Ankara, Turkey

Members of the NBS staff made presentations describing NBS activities and facilities to the Workshop, directing their discussions to those aspects most relevant to the surveys.

The NBS/AID Survey of Ecuador followed immediately after the Workshop. With the exception of Mr. Isfendiyar, all of the visitors at the Workshop joined the Ecuadorean Survey Team. The U.S. NBS representatives were:

Mr. H. Steffen Peiser
Chief, Office of International Relations

Dr. Sanford B. Newman
Senior Program Analyst

Mr. Thomas M. Stabler
Chief, Office of Weights and Measures

The Team spent ten working days in Ecuador. It visited universities, industrial organizations, and government offices in Quito, Guayaquil, Cuenca and several other cities. The Survey of Ecuador is described in NBS Report 10881.

In the second half of June, 1972, the NBS/AID Survey of Korea was held. Somewhat more ambitious aims reflecting the greater extent of industrialization in that country were adopted. The report of that survey is also to be distributed as an NBS report.

V. Brief Notes on the Economy of Turkey

Turkey has a population of about 37 million growing at more than two and one-half percent per year. It occupies a territory of about 300,000 square miles (780.580 sq. km). The literacy rate is about 50 percent but progress has been rapid. The largest but not the most populous region, is the central plateau of Anatolia in Asia Minor. Istanbul, by far the largest city with approximately three million inhabitants, is located in Thrace, the European portion of Turkey. The capital, Ankara, is in Central Anatolia and at present has little industry, but industrial expansion is evident. The principal Aegean port of Izmir and the Mediterranean port of Mersin-Adana have considerable industrial activity but are greatly overshadowed by the heavy concentration in the Istanbul area.

Turkey's annual GNP now probably exceeds U.S. $14 billion (at current market prices); the real growth rate approximates the seven percent forecast in the second Five Year Plan, the period for which is now ending. The third Five Year Plan starting in 1973 was accepted in the parliament on October 26, 1972. There is no doubt that industrial manufacturing is expected to be the main source of future economic growth. Turkey is almost certainly rich in natural resources, although many of them lie as yet unexplored under volcanic lavas. So far only chrome ore and ferrochrome, copper and borax are significant exports. Textiles and metals manufacture have begun to add to the export volume. The principal agricultural products are wheat, sugar beets, grapes and barley; the chief agricultural exports are cotton, various nuts and tobacco. Turkey, presently an associate member of the European Common

Market, hopes to become a full member. Agriculture alone cannot expand at a rate adequate to help Turkey attain its social and economic goals. (The good record of recent years must be attributed, at least partly, to unusually favorable weather.) Despite recent gains, Turkey has the lowest per capita income of all NATO and OECD countries--less than U.S. $400 per year.

The "Consortium for Aid to Turkey," composed of a number of OECD countries including the U.S., provides development assistance, but such aid has decreased in recent years. USAID has an active mission in Ankara. Repatriated earnings of Turkish workers abroad and the growing tourist trade are favorable influences on the balance of payments. In recent years inflation has posed a considerable problem, with the rate in 1972 amounting to about 18 percent.

Whatever political changes may be in store for Turkey, it seems likely that the basic philosophies going back to Kemal Ataturk and the revolution of 1923 will remain influential. These emphasize modernization, economic growth, industrial development, and a European rather than an Asiatic orientation, pursued within a framework of rational self-reliance. These goals would appear to necessitate an increasing use of modern technology.

VI. Notes on Science and Technology in Turkey

As in other countries, the pursuit of education has been a feature of Turkish culture. In accordance with the reorientation of Turkey's goals by Kemal Ataturk and more recently the promulgation of new and ambitious industrialization goals based on technology, Turkish universities have increasingly emphasized the teaching of science and engineering.

The Middle East Technical University (described in more detail in the Appendix) is rapidly expanding its engineering and applied science teaching and research capability and with high standards of academic excellence. The much smaller Bosporus University (formerly Robert College) is assuming a similar role (see Appendix). Teaching at both of these universities is in English, which benefits students both in expanded accessibility to the technical literature and in their later professional lives. Universities such as Istanbul Technical University, Hacettepe University in Ankara and some others also appear to be making important progress.

The Government of Turkey is said to control and largely finances all universities, which it regards primarily as teaching establishments for the preprofessional training of full time students. The universities do not yet appear as cultural and educational centers in which all

citizens are able to share. Consultation to industry is given by individual professors, but such activity is often criticized as interfering with a professor's primary responsibility to his students. Generally, teaching loads are demanding, and some professors are apprehensive of further increases in the student to faculty ratio and of the highly structured and protracted chain of promotion to the very few available professorships. Students rarely work part-time in industry. They believe that it is often difficult to gain the acceptance and understanding of industrial managers. Thus, a casual visitor to Turkey receives the impression that, although student training at its best is excellent, governmental, industrial and community relationships with universities are not as strong as they should be.

Government officials in Turkey appear to be aware of the economic importance of science and technology. The State Planning Organization sets basic policy on the development of science and technology. The chief operational institution is "The Scientific and Technical Research Council of Turkey" (TBTAK). It is an independent institution established by law in 1963 and financed by the government. Its broad mission and authorities correspond to many of those delegated in the U.S. to the National Science Foundation (NSF), National Academy of Sciences (NAS), National Research Council (NRC), National Institutes of Health (NIH), and National Bureau of Standards (NBS). Close contacts with these organizations should prove profitable. TBTAK is responsible for funding fundamental and applied research both in-house and by contract. It is charged also with (i) formulating national science policies, including those related to technology, research, teaching and international relations, (ii) training scientists and technologists, and (iii) publishing information and holding conferences on research, both pure and applied.

At first sight the TBTAK mission in science and technology seems so all encompassing that one wonders if any technical role remains for other agencies in Turkey. However, the existence of such organizations as the Defense Laboratory, the Mineral Research Institute (see Appendix 1) and the Turkish Standards Institution (TSE) itself are proof that one should interpret the mission of TBTAK as permissive rather than exclusive.

Recently TBTAK has taken very important initiatives within its charter. The Documentation Center (TURDOC), the Building Research Institute and the Institute of Life Sciences may be mentioned. The first of the above has already been studied by Peter Judge of OECD. The survey team did not include a specialist in building technology, so the Building Research Institute received but little of the team's attention. Maintenance of contacts between it and the NBS Center for Building

Technology would seem to be indicated. The Institute of Life Sciences, of course, falls largely outside the NBS mission area.

The new development within TBTAK that is of greatest relevance to the present survey is the Marmara Scientific and Industrial Research Institute (MSIRI) which has recently begun operations with ambitious goals and a great deal of drive. Among many other tasks MSIRI has undertaken to carry out industrial research and extension services including problem-solving consultation for small enterprises. MSIRI is authorized to accept contracts but does not expect to be totally reimbursed for its services.

It is too early to predict how effectively industry will utilize assistance from MSIRI. Probably different attitudes by the State Economic Enterprises (SEE's) must be expected. There are SEE's in the following fields, among others:

(i) Iron and steel (There are some private interests involved in this industry.)
(ii) Fertilizer
(iii) Sugar
(iv) Paper
(v) Mechanical and chemical industries
(vi) Cement
(vii) Textiles (only 28 percent is government operated and the percentage is falling)

Much of power production and natural resource exploitation is also in government hands. Most of these operations and enterprises report either to the Minister of Energy and Natural Resources and/or to the Minister of Industry and Technology. The SEE's seem to be generally regarded as less efficient and more bureaucratic than similar private enterprises. Although this view is apparently shared and accepted at the highest levels in the Ministry, there is some parliamentary pressure to nationalize other industries, for example, the borax industry. Boron ore is an important export with opportunities for expansion. The nationalized industries are also said to do less research and to hire fewer Turkish consultants than private industry.

There are many professional and promotional organizations which exercise technical functions and provide active services. These are grouped into two big Unions as follows:

1. Union of Chambers of Commerce, Industry and Commodity Exchange

2. Union of Turkish Engineers and Architects

The Union of Chambers of Commerce, Industry and Commodity Exchange comprises quite a large number of societies as indicated below.

a. Six Chambers of Industry at Istanbul, Izmir, Ankara, Eskisehir and Kayseri

b. One hundred to one hundred and fifty Chambers of Commerce at various cities and towns; some in the smaller towns (e.g., Mersin) are combined with the corresponding Chamber of Industry

c. Eighty to one hundred Commodity Exchanges at various cities and towns. Istanbul, Izmir and Adana have the largest and best known Exchanges.

The role of this Union includes close relationship with the Turkish Standards Institution (TSE) to participate in development and implementation of standards. The members comment on draft standards, send representatives to TSE meetings, and advise members of the Union on the TSE certification mark. (See Section VII.)

The Union of Turkish Engineers and Architects comprises 13 chambers, as follows:

a. Chamber of Mechanical Engineers
b. Chamber of Agricultural Engineers
c. Chamber of Forestry Engineers
d. Chamber of Architects
e. Chamber of Civil Engineers
f. Chamber of Geodesy Engineers
g. Chamber of Shipbuilding Engineers
h. Chamber of Chemical Engineers
i. Chamber of Metallurgical Engineers
j. Chamber of Ship Machinery Engineers
k. Chamber of Mining Engineers
l. Chamber of Electrical Engineers
m. Chamber of Meteorological Engineers

The role of this Union is to provide a focus for the common concerns of the engineering professions and to inform related ministries of the views of its constituents on new legislation. In addition, it publishes technical periodicals, cooperates with TSE in the preparation of standards, provides rapporteurs for draft standards, comments on drafts, proposes preparation of new standards, requests revision of existing standards, and provides quality certificates for goods which do not have Turkish standards.

VII. The Turkish Standards Institution (TSE)

The Turkish Standards Institution was established by Statute No. 132, a private bill, which was published in the Official Gazette on November 22, 1960. TSE's structure, duties, revenues, general operating regulations and even the location of its headquarters are given in some detail in this organic legislation. It describes the Institution generally as a public organization having a juridical personality. In the field of Turkish Standards, TSE is given unique responsibilities; only standards adopted by the Institution may be called Turkish Standards. Although TSE standards are optional they may be made mandatory by decree of the Council of Ministers. Only Turkish Standards may be made mandatory.

To implement this responsibility, authorization is provided for the following:

- Scientific and technical research in standards problems
- Cooperation with international standards organizations
- Cooperation with universities and other scientific and technical organizations
- Publication of standards
- Creation of standards archives
- Establishment of laboratories for standards research and implementation
- Reporting on technical activities carried out in response to the needs of the public or private sector
- Training personnel for standards work; conducting courses, etc.

Statutory organization of TSE consists of five bodies; the General Assembly, Technical Council, Board of Governors, Auditors, and the Standards Preparatory Groups.

a. General Assembly - Either directly or indirectly the General Assembly controls the Institution's activities. It consists of both appointive members and representatives named in the Statute. Appointed members are recruited from University chairs and Institutes concerned with standards, other affected scientific organizations, and the Union of Turkish Chambers of Engineers and Architects. Other members are chosen from the Ministries of Commerce, of Industry and of Reconstruction and Housing, and from other Ministries concerned with standards and from institutions that are subject to or supervised by these Ministries. Finally, contributors to the revenues of TSE are represented by members of the Union of Chambers of Commerce, Chambers of Industry and Commodity Exchanges, banks and private organizations. No specific limitation is imposed on the number of appointive members save

that the number will be established by the General Assembly and the number from any sector shall not exceed the number from the remaining groups.

Members named in the statutes, (i.e., natural members) include the departmental directors of Ministries with organic acts which require standardization activities, the chairmen of preparatory groups active at the time of the Assembly meeting, and former chairmen of the TSE Board of Governors. Provision is made for honorary membership based on significant contributions and achievements in standards work.

b. Technical Council - This body is assigned the authority for the adoption of draft standards and the determination of which ones should be recommended for mandatory status. The Council consists of the natural Ministry members of the General Assembly, members of the Board of Governors, Chairmen of the Standards Preparatory Groups and individuals elected by the General Assembly from among University, professional and commercial delegates in the appointive membership of the General Assembly. At least 15 members constitute a quorum and a two-thirds vote is required for adoption of standards. There is no appeal from Council decisions.

c. Board of Governors - This is the executive body of TSE and is composed of six members chosen by the General Assembly from among its members. One third of the members are replaced or reelected each year and alternates are chosen at the same time as the members themselves. The chairman chosen each year by the Board represents the Turkish Standards Institution. Although the position carries the designation Chairman, the incumbent appears to be given the title of President.

Finally, the Board of Governors appoints the Secretary General who has responsibility for implementing the operations of the Institute. The Secretary General is chosen from qualified persons and becomes a natural member of the General Assembly and of the Board of Governors. The incumbent has served for nine years.

d. Auditors - Accounts and transactions are audited by this group which consists of the representatives of the Ministries of Commerce, of Industry and of Reconstruction and Housing in the General Assembly.

e. Standards Preparatory Groups - These are committees established to produce draft standards by the General Assembly, which appoints the chairmen. A chairman may appoint any number of Technical Groups (i.e. subcommittees) as are needed to work on specific aspects of the problem area. The present policy is to maintain Councils of Experts in the following areas:

Electrical
Electronic
Civil Engineering
Chemical Engineering
Laboratory Procedures
Mining
Metallurgical Engineering
Mechanical Engineering
Legal Procedures
Engineering Services (units, measurements, definitions, calculations, etc.)
Textiles
Agriculture
Petroleum Products (refining of petroleum)
Petrochemicals
Forest Products and Forestry

More than 300 persons are estimated to participate in the working groups which comprise the technical council. In addition, TSE provides a support staff of about 50 full-time people to assist in the work.

Sources of revenue are also identified in the statute. These fall into the following areas:

a. Dues from the Union of Chambers of Commerce, Chambers of Industry and Commodity Exchanges; Chambers of Commerce and Industry, Chambers of Commerce, Chambers of Industry and Chambers of Commodity Exchanges with yearly revenues of more than 200,000 lira. This is the largest single item of income and consists of a membership fee of three percent of the annual revenues of these organizations.

b. Contributions from state enterprises. This is the second largest item and results from a charge of 5,000 TL against each state corporate enterprise plus a small percentage of the profits.

c. Fees collected for services provided by TSE either to the government or the private sector.

d. Revenues from publications and from use of the TSE certification mark.

e. Grants, contributions and similar support.

In the last year (1971) the accounts receivable from various sources were approximately the following:

Source	Turkish Liras	U.S. Dollars (approx.)
State Enterprise (5000TL/per)	250,000	18,000
State Enterprise (percent of profit)	835,000	60,000
Commercial and Industrial Organizations (3 percent revenue)	3,200,000	230,000
Laboratory Services (fees)	860,000	61,000
TSE Certification Marks	561,000	40,000
Ministry of Finance Allotment for Purchase and Maintenance of Laboratory Equipment	600,000	43,000
Miscellaneous (interest, rents, etc.)	306,000	22,000
Publications	844,000	60,000
Total	7,456,000	530,000

It should be emphasized, however, that these are accounts receivable and not revenue in hand. The amount actually paid to TSE was 5,772,000 TL. Some Chambers are in arrears, and this constitutes the largest amount of uncollected obligations. TSE seems reluctant to move strongly to reduce these arrears and is relying on persuasion and indirect pressure to remedy the situation.

Based on an expected income of 6,000,000 TL the present fiscal plan for TSE would result in a deficit of 24 percent. However, the Secretary General pointed out that the fiscal plan is a target budget and may be judiciously altered as circumstances and revenues warrant. He indicated that income and expenditures were currently in good balance because a number of positions in the operating staff were unfilled.

The laboratory operations are divided into three sections:

Electrical and Electronic - A newly appointed director has not yet joined the staff. He is reported to be a well qualified engineer about to finish his military duty.

Mechanical and Construction Materials - Mr. Isfendiyar, the Secretary General, is acting as director of this laboratory.

Chemical and Materials - Dr. Argun Dagcioglu, who was a former guest worker at NBS, is director of this laboratory.

The table of organization for the laboratories also lists the following positions:

Graduate engineers	6
Graduates of technical schools (Jr. Engineers)	1
Graduates of technical institutes (Trade Schools)	5
Secondary school graduates	1
Service personnel	3

In addition to the laboratory staff a separate group lends support to the preparatory groups. This includes:

Engineers (Chemical, Civil, etc.)	5
College graduates (BA's non-scientific)	13
High school graduates	17
Secondary school graduates	9
Primary school graduates	6

Finally, there is a large service staff:

Guards, doorkeepers, cooks, etc.	31
Total listed positions	97

At the time of the Team's conversations with the Secretary General (October 1972) the staff numbered approximately 85, the vacancies reflecting the need to keep in balance with the anticipated revenues. Not all of the support staff listed above are full time employees. Many of the individuals assigned to the preparatory groups are working while continuing their education.

TSE appears to be a well run and well regarded asset of the Turkish economy. Like all healthy organizations, however, it accepts the need for critical introspection. As a result it has appointed a committee to evaluate its present operations and offer recommendations for their improvement and further development. Professor Can, the head of this committee, provided an invaluable service by giving the Survey Team generous portions of his busy days and frank discussions of the committee's considerations. The Can Committee has not yet reported to the President of the Board of Governors so it would be inappropriate to preempt the formal presentation of its findings. However, a few general statements may be helpful to indicate the Committee's thrust and orientation.

Either in its charter or in the acceptance of its task (the origin is not clear), the Can Committee has limited itself to an analysis of staff operations and structure. It was explained that the remainder of the organization was defined by law and therefore impossible to alter without requesting legislative changes. Thus, in effect, the basic structure of TSE was excluded from the Committee's review.

Despite this limitation, the Can Committee is confronting some of the serious and recognized problems in the Institute's operations. Probably the most important of these is the level of support for the experts involved in the preparatory groups. Both professional and support services require strengthening if the experts--many of whom are prominent academicians, engineers, technologists and industrialists--are to continue or increase their efforts in standardization. Since only nominal remuneration is now provided, continued participation of many capable TSE associates is dependent on freeing them of burdens which ought to be the functions of the supporting staff. The Committee will probably recommend a considerable expansion in this area.

Professor Can and his colleagues have also addressed the question of adequacy and utilization of facilities. In May of 1964 TSE moved into its present quarters in Ankara, conveniently located near many government activities. They include a large auditorium, administrative building, laboratories and meeting rooms. The buildings and their surroundings are attractive, well maintained and a tribute to the vision of the designer who anticipated the important role of standardization in the development of Turkish industry. An unfortunate and, one hopes, temporary aspect of this success in providing for the long-range physical needs of TSE is that both the buildings and the laboratory equipment are underutilized. Thus, for example, a fairly comprehensive array of physical testing equipment was displayed in the organic materials laboratory, but was apparently little used. One of the laboratory buildings was designed as a packaging laboratory and has never been equipped, though a comprehensive plan and design are in existence. TSE could function as a training center for the Middle Eastern region provided its professional staffing and laboratory activities reach a more flourishing level.

The Can Committee apparently intends to recommend increased staffing and specialization in the laboratories but some facets of the question go beyond such palliatives. Several members of the Survey Team questioned the ability of the TSE laboratories, stationed as they are in Ankara, to service national industry, more than 50 percent of which is located hundreds of miles away in the Istanbul area. This question apparently was of equal concern to the Committee, but pressures and arguments, pro and con, make it difficult to reach an objective recommendation. Representatives of some Chambers were emphatic on the

need for regional laboratory services, others were not. This disagreement underlines the main defect of current planning in TSE, namely, the lack of objective studies to determine the present needs and assess the future needs for TSE services. This defect is certainly recognized by some members of the TSE clientele. Mr. Sakip Sabanci, the President of the Adana Chamber of Industry, was quick to indicate the need for study before the laboratory requirements for the Adana region could be established.

Intimately linked to the problems of laboratory services is the future role of TSE in metrology or the maintenance of primary standards. Turkey has enacted a detailed and ambitious statute (No. 1782) which places responsibility for measurement regulation and control in the Ministry of Economy and Commerce. All evidence presented to the Team indicates that there is little implementation by the Ministry. A group of field inspectors of unspecified number is in existence, but lacks any laboratory facility or sophisticated equipment. Metering of gas and liquids by public and private utilities is generally controlled through internal mechanisms coordinated in some cases with government agencies. The general level of control of weights and measures seems to be unknown.

Dr. Brombacher's 1957 Report on "Proposed Laboratory Facilities for the Turkish Standards Institution" concluded that administrative control of the primary standards laboratory should be vested in TSE. He recommended that the laboratory have custody of the standard meter bar, the standard kilogram and the standard liter, then deposited in the Is Bankasi (a bank) at Ankara. The Standards are still in the custody of Is Bankasi, and the Team is not inclined to support Dr. Brombacher on this point.

VIII. The Technical Service Functions Needed in Industrializing Economies—Their Availability in Turkey and the TSE Contribution

A. Standardization and Measurement

1. Standards Development

Because of individual national characteristics, each industrializing country requires its own standards writing activity. In Turkey, the need for increased capability for standards writing, particularly for technical staff support, has been recognized. By Turkish law, standards writing is clearly the responsibility of TSE. In the opinion of the survey team, this function is fulfilled in exemplary fashion, as discussed in Section VII.

2. Facilities for Development of Test Methodology for Standardization and Quality Control

Most modern test equipment and expertise appear to exist in Turkey, but a central facility with most of the needed equipment is not available in one place, not even at TSE. Thus, it is the responsibility of TSE to equip itself for the development of all kinds of test methodologies. Standards writing committees must know the choices in test provisions to be incorporated in written standards and their potential effect on production and quality control. Even when an international or foreign national standard is adopted, the test procedures involved should be validated by practical experience in the local environment.

TSE should adopt one of the following basic plans for providing test methodologies:

(i) Use of test equipment and expertise wherever available in Turkey.

(ii) Expansion of types of test equipment and technical staff capability at TSE.

(iii) Contracting for the services of major outside facilities to provide TSE with test methodology experimentation services for support of standards writing.

The Team regards the second alternative as the most desirable, because it would strengthen TSE for the long run. It is recognized that it might prevent TSE from moving ahead rapidly on other services in the immediate future.

3. Certification Mark of Excellence for Manufactured Products

The subject of a national certification mark deserves the following general remarks which are contributed by Mr. Raul Estrada.
"Standardization has now come to be realized as a powerful tool for economic development in most parts of the world. This realization has led in the past few years to the establishment of a large number of National Standards Bodies or centres for development of national standards in developing countries. This certainly is one of the important steps all developing countries have to take to streamline the development plans and lay a sound basis for industrialization.

"One of the common phenomena noticed in all the developing countries is lack of quality consciousness in most industries. There are many reasons for this state of affairs. One of them is the lack of

qualified, experienced technical personnel. Another is that in most of these countries the demand for materials and products usually exceeds the supply, resulting in a seller's market. Under such conditions the producer is tempted to make a quick profit without any regard for the quality of the product he manufactures. Additionally, because of the low purchasing power of the average consumer, the buyer usually seeks the cheapest product in the market. The cumulative effect of all these factors is that there is scarcely any incentive to manufacture quality products, and this, in turn, encourages the production units to ignore quality control procedures in their enterprises. Thus, there is usually a preference for imported goods by the more affluent segments of society in these countries.

"In the developed countries, the picture is entirely different. Most of the industries are highly conscious of quality. They have qualified technical personnel and usually a separate quality control department not only to keep vigilance over the quality of their products but also to educate the production personnel. Keen competition in the internal market, the need to establish a reputation in the external market, and the export incentives given by the Government provide a further fillip to produce quality goods. Also, in most developed countries, rigid government regulations with regard to health and safety of personnel make it obligatory for many industries to adhere to certain minimum levels of quality. Further in these countries consumers are not only, themselves, alert to standardization and quality but also form powerful and effective consumer associations to look after their interests. These associations carry out comparative tests and evaluation of industrial products and publish the results in their journals for the guidance of their members.

"It is therefore important that several steps be taken in developing countries to promote standardization and quality control activities.

"Firstly, they should formulate standards for materials and products which have impact on the national development, the health and safety of personnel, and on exports. Secondly, quality control procedures should be initiated in the manufacturing units to realize the standards which have been promulgated.

"In order to achieve these objectives, many of the national standards bodies have been entrusted with the work of implementing the national certification mark of quality. The procedures for operating the national certification mark of quality differ from country to country. The basic principle is that under this scheme a detailed procedure for quality control is prescribed for use in the production unit and then in the control of the manufacturer by the national

standards body. It could also be termed the "Technical Audit" of the quality control operations of a manufacturer by the national standards body.

"Occasionally producers in developing countries submit samples of their products to certain test houses. The test certificates issued are utilized to sell their entire production. This is a dangerous practice as the certificate pertains only to one or more samples submitted for testing and not for the entire production, and there is no assurance that the whole production is of the same quality. It is necessary to operate the national certification mark of quality in developing countries through a National Standards Body which will take the responsibility to see that proper sampling procedures are used.

"One of the questions usually asked is why a national standards body should undertake such a service. The answer could be briefly summarized as follows:

a. In a developing country there is likely to be a serious shortage of trained technical personnel as well as financial resources. Therefore both have to be conserved and utilized to the best advantage. Overspecialization of institutions in developing countries is therefore unwise and uneconomical.

b. It is the national standards body which prescribes the most suitable standards of quality. It is the one which by objectivity, knowledge of requirements in other countries, etc. should be best equipped with all the background knowledge related to standards. Hence, it is most suited to prescribe the required quality control procedures and to certify conformity of a product to the relevant standard.

c. The field data collected as a result of certification of products can be fed back to the technical committee responsible for the preparation of the standard and for its review as necessary.

"Taking all these factors into consideration the ISO has recommended that each national standards body may institute a certification mark of quality to assist the consumer. In fact, discussions are underway in the ISO to work out a procedure under which the national certification mark of quality of one country could be recognized by another country.

"It is therefore an important consideration for a developing country to foster the introduction of quality control procedures in industry, establish the national certification mark of quality for domestic use and also assist in quality control, preshipment inspection and certification for export. These steps would assist in producing

quality goods in the country, optimally utilizing scarce national resources, building a better image of the country abroad, increasing exports and earning foreign exchange so badly needed for the development of the country."

Turkey through TSE has an exemplary system for quality assurance and guaranteeing of manufactured products, though there has not yet been time for it to be exhaustively applied. The system is based on compliance with Turkish Standards (written and disseminated by TSE) and will become even more effective as public and governmental acceptance grows, and as more standards become available. TSE should continuously review whether a more searching evaluation is needed of manufacturers asking to receive the quality mark. The certification mark can be a strong contribution to the Turkish economy through the development of confidence by the public and customers outside the country. The system could be further strengthened by improving the controls at plant level and introducing a good training program in Quality Control conducted by TSE.

4. Internationally Recognized Certification of Products

In international trade the practice of acceptance by importers of tests performed in the country of manufacture may become more commonplace, although there are few regions of the world where such a practice is followed presently. Turkey should participate in any such developments. The good international reputation of TSE in the international standards community makes it well suited to play a strong role in this. However, TSE needs financial resources for conducting negotiations for certification recognition. The international financial rewards to Turkey may be large, especially as regards trade in the European Common Market.

5. Product Testing

The testing of products for conformance to Turkish standards is a prerequisite for the initial or continued granting of the right to use the TSE mark on products. Hence it is one of the two central concerns of TSE (the other being the preparation of product standards).

The study team toured the TSE laboratories. Dr. Argun Dagcioglu, Director of the TSE Chemical Laboratories, and his assistants conducted the tour and participated in extremely useful discussions. The TSE facilities have already been sketched earlier in the report. The team found the facility to be excellently equipped and housed but seriously understaffed and underutilized. However, as the number of Turkish standards in use increases, the workload of the testing laboratory will

likewise increase, which will permit the recruitment of more young professionals. This is already clearly established as a goal of the TSE management, and one which the study team strongly endorses.

A further problem at the present level of staffing is that the four professional members of the testing laboratories staff must operate a wide variety of tests, so that a deep familiarity with the techniques is difficult to attain. Further growth of the staff should permit individual members to specialize in certain techniques for long enough periods of time to become thoroughly familiar and expert. The enhancement of expertise so realized should be of great benefit to the reputation of the TSE and to the quality of its laboratory work. In addition, this new reservoir of local expertise should be most valuable to the work of the standards writing groups.

As in all industrializing countries, TSE as a central standardization laboratory is not expected to be the only testing laboratory. In Turkey the following test facilities have been identified:

1. TSE Laboratories

2. ARGE Laboratories (a military lab mainly for development of items related to army goods)

3. TBTAK (Turkish Scientific and Technical Research Organization--laboratories are under construction near Istanbul--headquarters are in Ankara.)

4. Istanbul Technical University (Mechanical Laboratory; Agricultural Machinery and Tools Laboratory; Electrical and Electronics Laboratory; Hydraulic Laboratory; Chemical Laboratory, etc.)

5. Istanbul University, Faculty of Forest Research Laboratory

6. Hide Chemists Association, Istanbul

7. Sumerbank Beykoz (hide and shoe factory)

8. SEKA (paper and carton factory laboratory)

9. Ankara Sugar Research Institute

10. Tekel, Tobacco and Liquor Research Institute, Istanbul

11. Ankara University, Faculty of Science Applied Chemistry Laboratory

12. Ankara, Lalahatun Veterinarian Research Institute (meat, milk, wool, etc.)

13. Ankara University, Veterinarian Faculty, Biological Research Laboratory

14. Ankara University, Agricultural Faculty, Agricultural Industry Research Laboratory

15. Ankara Forestry Research Institute

16. Mineral Research and Exploration Institute

17. Middle East Technical University Laboratories

18. Turkish Cement Producers Association's Research Laboratory

19. State Water Works Laboratory (building construction materials)

20. State Highway General Directorate's Laboratories

21. Izmir Olive Research Institute

22. Izmir University Laboratories (agricultural products)

23. Ankara Health Preservation Institute's Laboratories (foodstuffs)

24. Adana Cotton Research Laboratory

25. Antalya Citrus Fruit Research Laboratory

26. Aydin Fig Research Institute

27. Yalova, Vegetable and Fruit Research Institute

28. Tekirdag Grape Growing and Wine Research Institute

29. Erzurum, Ataturk University, Animal Breeding Institute

30. Samsun Tea and Field Produce Laboratory

31. Seed Improvement and Production Organizations in numerous cities

Turkish authorities must decide whether TSE is to take the primary leadership role in test laboratory operation, and whether within its own

facilities or perhaps through adoption of the Australian system of accredited test laboratories. Such a system can be run on a partly reimbursable basis by certifying competence, staffing and equipment for particular types of tests. Under it, laboratories may earn certificates of reliability somewhat analogous to the TSE product certificate marking. The laboratory so accredited for a given test will guard its reputation but could conduct tests for profit. To operate such a system of accredited laboratories would be an important and demanding function for TSE.

As an alternative the TSE leadership has been considering the establishment of provincial test laboratories. Supporters of TSE in Chambers of Industry look to TSE for such services. The NBS/AID survey visitors have doubts about the advisability of attempting such district services. It is not clear without a more searching study that this should take precedence over strengthening the TSE laboratories in Ankara. Test laboratories should be designed to include routine and repetitive work for process or product quality control. This kind of testing requires generally different facilities and staff from those required for TSE's other functions. The establishment, equipping and staffing of provincial laboratories is liable to drain much needed resources from the central laboratories. Naturally these reservations should be overruled if this provincial test laboratory function is really expected from TSE. However, no laboratory should be started without careful analysis of actual need in specific subjects in specific geographic locations. From TSE's viewpoint a chemical analytical test laboratory would probably be easiest to provide, would have the most varied applicability in most industrial centers, and would be easiest to run on a reimbursable basis once the equipment has been purchased. These laboratories could perhaps be modeled after the British Public Analysts operations.

6. Calibration of Instruments and Physical Standards

The TSE is not a laboratory of basic metrology. That is, it does not realize the SI units by absolute methods or by intercomparison of physical standards with the Bureau Internationale des Poids et Mesures (BIPM) or other national metrological laboratories. Of course, metrology is inherent in the many instruments used in the TSE laboratories for the testing of products. However, in general, the accuracies of these instruments are known only through whatever claims their manufacturers may have originally made, coupled with some assumptions about stabilities. TSE does not presently exercise procedures for periodic recalibration, as it might do by, e.g., self-calibration performed on the premises, return of instruments to their manufacturers, or sending the instruments to other national laboratories or to high-quality commercial calibration laboratories abroad.

Thus the TSE is not presently oriented towards precision instrumentation. To illustrate this point further, one may note that of the twelve hundred Turkish product standards listed in the TSE catalog for 1972 only three refer to instruments regarded as products to be tested. These are for watt-hour meters. However, the TSE does not possess a precision watt-hour instrument, and whatever physical standards of this kind may exist are maintained by the electric power utilities of Turkey without reference to TSE. The most precise instrument available at TSE is probably its set of gage blocks.

Furthermore, TSE is not at present a central focus for the maintenance of working physical standards. These are somewhat scattered in Turkey. Besides those in TSE, the Ministry of Commerce presumably has working standards appropriate for weights and measures surveillance, and standards for electric power and the metering of water and gas are said to have an independent existence in the hands of power and water utilities.* There is apparently little or no coordination or intercomparison of any of these physical standards.

The foregoing remarks are offered, not as a criticism of TSE, but rather to orient the reader, since the phrase "standards institution" has various connotations.

Indeed, no institution in Turkey is devoted to basic physical standards as such. The weights and measures program of the Ministry of Commerce does not include such an activity. Only a small instrument calibration and repair unit is planned for the Marmara Scientific and Industrial Research Institute of the Scientific and Technical Research Council of Turkey (TBTAK) at Gebze near Istanbul.

The TSE hopes to offer calibration services by comparisons with its reference instruments, but as yet it has performed only a few ad hoc calibrations. (It has calibrated mechanical testing machines in plants by transporting its proving rings to the machines, and also has calibrated some ac voltmeters and ammeters.) This deficiency does not appear to be troublesome at present. Turkish industry today requires, at most, an intermediate level of accuracy in machine shop operations, dies and forms, and process controls. Such a level of accuracy is generally obtainable at modest cost via foreign instrument makers, most of whom are anchored to the basic standards maintained in the major national metrological laboratories of their own countries, and indirectly, to BIPM. Also this level of accuracy may be increasingly

* After our visit we were informed by Professor Dr. Mithat Coruh, Director of the Institute of Technology of Hacettepe University (Ankara), that it is planned to create a Calibration and Quality Control Division within the Electrochemical Department of his institute which will adjust and calibrate biomedical instruments for Turkey and other CENTO Countries.

available from TSE if that organization expands its calibration services and takes steps to assure the traceability of its own reference standards to reliable sources.

The NBS-AID team saw no evidence to suggest that it would be a wise expenditure of resources for Turkey to enter the sphere of basic metrology at present, as the economy does not seem to require it, and it would be costly to do so. Basic metrology finds application most directly to high-technology pursuits, such as electronics, aircraft, navigation and geodesy. Our tours, in which we were shown many examples of foreign technology recently domesticated and adapted in Turkish manufacturing, convinced us that the level of sophistication of Turkish manufacturing will continue to advance. Hence, although the team concluded that basic metrology is not needed now, it will not be amiss to inquire how precision metrological services are to be supplied in Turkey at some time in the future when they may be needed.

Of course, calibration services can continue to be obtained via foreign instrument makers. However, a domestic instrument industry based on conventional instruments (e.g. watt-hour and other electrical meters, precision gages for machining, etc.) is foreseeable, and it would provide a stimulus for native provision of standards of physical measurement. Ultimately, it should become cost effective for Turkey to have a central instrument calibration facility at about the level of, say, the best commercial calibration laboratories, industrial standards laboratories, or military standards laboratories of the U.S. Such a facility would maintain secondary physical standards. It should have an official or at least quasi-official status for two purposes: (1) To give it access to BIPM or the national metrological laboratories of friendly countries for calibration of the Turkish physical standards, and (2) To give visibility to its existence and functioning so that small but not unsophisticated enterprises with limited access to technical information will know where to turn for help and advice on measurement problems.

Various loci may be imagined for such a laboratory, including the technical universities, the Ministry of Commerce, TSE, and TBTAK. Experience elsewhere has shown that universities are not best-suited to perform this function because of their different emphasis and the transience of their labor force. The suitability of the Ministry of Commerce also is dubious on the basis of its present performance and because basic metrology supports a wider spectrum of concerns than just commercial ones, e.g., national defense, environment, etc. TSE may possibly qualify, but its emphasis on product testing and on considerations of the marketplace, its modest resources, and its private status would appear to be disadvantages. A further factor is the common experience in other countries that calibration services must be

supported by considerable development work on methods. This is expensive and cannot be supported from calibration fees without many customers feeling that the costs are prohibitive. Thus it would be difficult for TSE, with its avowed policy of being as fully self-supporting as possible, to provide the necessary supporting R&D. TBTAK with its emphasis on a broad spectrum of applied research, its substantial resources, and its official status may be an attractive possibility. Finally, a completely independent, though official, status for such a laboratory might also be envisioned, but would seem to be much less healthy than for the measurements laboratory to be immersed in the main stream of Turkish applied research. It appeared to the team that this main stream would probably lie in TBTAK, although this conclusion is extremely tentative, due to our very brief and incomplete acquaintance with that organization and the fact that it has not yet reached its planned operating level or completed its laboratory facilities.

It is obviously too soon to make recommendations on this future concern. For now, TSE should be encouraged to extend and improve its calibration services to meet known needs. At a later time, when the need for precision measurement services is more clearly seen and when the nature and qualities of TBTAK have been made clear by operating experience, the question of where the national capability for advanced metrology should be focused may be reexamined.

7. Standard Reference Materials (SRMs)

SRM's are well-characterized materials, produced in quantity, to calibrate measurement systems. Because SRM's are easily transported to the site of the user, the user may perform an on-site calibration of his measuring process to assure accurate and compatible measurements.

The industrialization of Turkey is proceeding rapidly and many industries and companies are presently benefiting from or could be benefiting from the use of Standard Reference Materials. SRM's can be especially helpful in development of new industries due to the speed they offer in checking quality control processes in place.

Organizations in Turkey effectively using NBS-SRM's and/or other SRM's that were visited by the study team include the Etimesgut Sugar Refinery and Sugar Institute, the Mineral Research Institute, the Metas Steel Company, and the Rabak Copper Mills.

A focus is needed for the availability, quality, and effective utilization of SRM's in Turkey. Since many different SRM's are available from sources outside Turkey, the need to produce them

domestically can for the present be limited to special cases. In addition, the organization taking a leadership role in SRM's needs to actively promote the utilization of SRM's in cooperation with the organization concerned with the growing problem of environmental pollution. As the needs grow, secondary working standards production in Turkey should be undertaken both by industry and the institution providing the primary service.

Several organizations in Turkey are possible candidates for the long range leadership role needed to foster the effective use of SRM's. These organizations include TSE, TBTAK, and the Mineral Research Institute. To properly assume this role, the organization needs to have in-house competence in the field of SRM's and also in-depth laboratory work on materials to support the effort. In addition, close ties should be maintained with similar institutions abroad and with industries, the government, and universities in Turkey to promote the effective use of SRM's. It is also necessary to assess the future needs for SRM's and to draw upon the competences for the production of SRM's, wherever they may be available.

The financial support for the program can be partially obtained from the users. However, since the public derives benefits from an effective SRM program, government support is justified and probably is needed to provide a program of sufficient scope. This is especially true for SRM's in the fields of environmental quality, health, and defense, and also, though perhaps to a lesser degree, for industrial SRM's for economic growth.

NBS has in the past provided NBS-SRM's to TSE with AID support. These SRM's were shipped to TSE early in 1972 after discussion with Peiser of NBS during a brief visit to Turkey in February 1972. In general, the SRM's received by TSE match the needs. Additional requests for NBS-SRM's are expected to be forthcoming from TSE and other organizations in Turkey.

How TSE has already utilized these NBS-SRM's can be illustrated by the resolution of a dispute that arose between the Turk Tractor Company and a foreign steel supplier. The tractor company's analysis of a large batch of steel led them to believe the steel did not meet specifications, and they were prepared to return the steel. The supplier threatened legal action since his analysis showed the steel met the applicable standards. TSE's analysis, in which NBS-SRM's were used for calibration, confirmed that the steel met the specifications and that the Turk Tractor Company's analysis was in error. Rather surprisingly, the tractor company feels that SRM's are not needed in its plant for quality control!

As an interim solution, the team suggests that TSE should serve for the present as the focal point for the SRM needs of Turkey. As the laboratory facilities of the various organizations develop and expand and the need for internal production of working standard reference materials becomes necessary, a permanent focal point for SRM's in Turkey should be chosen. If TSE were to acquire this long-term responsibility, it would be necessary to expand its in-house materials staff and equipment and determine the SRMs needed for important measurement controls throughout Turkey.

8. Weights and Measures for Commerce

The measurement statute for Turkey (No. 1782) requires approval and regulation of a great variety of instruments used in commerce and trade. This specifically includes instruments for measuring length, weight, volume, area, water, fuel oil, electricity, gas, and railway freight and tank cars. Even taximeters require approval. With few exceptions, the metric system is mandatory for all measurements in offical and unofficial documents and transactions, contracts, labels, advertisements, etc. Importation or manufacture of non-metric instruments is with few exceptions, banned by the statute. Primary responsibility for implementation is placed in the Ministry of Economy and Commerce. The latter works in cooperation with municipal adjustment officers

Dr. William Brombacher, who was an NBS advisor to TSE in 1957, recommended laboratory facilities based on the assumption of a supporting role for TSE in commercial weights and measures. Means for calibrating the weights and working standards for volume used by local weights and measures control agencies as well as the basic requirements for length, temperature and electrical measurement were included in his proposal. Few, if any, of these recommendations have been enacted.

Although the Survey Team had no opportunity to observe the regulation of weights and measures, it received considerable assurance that implementation of the statute was incomplete and uncertain. Weights and measures officials were said to be operating in the field, but their number and the mode of interaction between the Ministry and municipal employees were never made clear. The Team was assured that the officials had no laboratory facility and maintained their field standards as best they could. The major public utilities essentially provide their own in-house calibrations which are usually accepted by their customers.

This testimony on the fragmented and incomplete regulation of weights and measures dissuaded the Team from attempting a comprehensive study of the problem. Time and resources could not be spared for the

required effort. However, the Team agreed that measurement interests of consumers in the purchasing of water, electricity and gas should command a higher level of attention from regulatory bodies. No strong evidence was presented of the erosion of general marketplace credibility because of the lack of stricter inspection or enforcement but, obviously, such a state of commercial weights and measures control would be considered inadequate in a highly developed country.

A calibration service for weights and measures operations is essential for optimizing the present effort. In the Team discussions there was some doubt about the advisability of establishing a comprehensive calibration service at TSE. SRMs were suggested as a wedge by which TSE could offer specialized calibration services, but available SRMs are largely irrelevant to the bulk of ordinary commercial measurements. The siting of calibration services will also be influenced by the evolution of metrological responsibilities. There was little inclination on the part of the Team to suggest TSE as a metrology center.

At this stage in Turkey's development there is a definite lack of in-depth information on needs and deficiencies in control of commercial weights and measures. Before any decisions on allocation of responsibilities and resources are made a comprehensive study and assessment should be completed. By that time, the implementation of TBTAK's plans as well as those of some of the universities, will permit an objective and realistic forecast for facilities, manpower, other resources and types of cooperation and assignments in the calibration services field.

9. Standards for Safety and Environmental Quality

As a nation becomes industrialized, the need for standards related to safety and environmental quality increases, and public demands to meet these needs grow. A start should be made in Turkey to provide the firm foundation needed to solve these problems before they grow to unbearable proportions. That pollution is a growing problem in Turkey was stated time and again by managers during the Study Team's tour of industrial firms in Turkey. In both safety and environmental quality, several items are needed to provide this firm foundation; these are:

1. measurement methods
2. instrument calibration services
3. calibration materials
4. assignment of acceptable level of risk or exposure
5. realistic assessment of benefits as well as costs
6. technology to reduce risk or pollution to an acceptable level

7. enforcement
8. written standards incorporating all or part of the above.

It should be TSE's responsibility to stimulate the interest of concerned governmental organizations and to help them meet the need for adequate standardization and measurement methods in these areas. Obviously, TSE will not have the central role in the solution to these problems, but should provide effective advice and consultation.

10. Building Material Standards and Construction Codes

Turkey is undergoing a rapid expansion of its construction industry coupled with the incorporation of many innovative materials and building systems. TSE has started to meet this need by developing standards for building materials. As mentioned earlier, performance standards, though more difficult to develop, are to be preferred over specification type standards, since the former tend to stimulate innovation, whereas specification standards tend to freeze designs.

TSE needs to work closely with the government agency concerned with construction codes to set priorities for standards to be developed. However, TSE should play no role in promoting the voluntary standards to a mandatory status. This is the responsibility of the regulatory government agencies.

B. Other Relevant Services

1. Import and Export Controls

Turkey, like most rapidly industrializing countries, needs to conserve its fiscal resources according to a careful plan and establish priorities in accord with national needs and goals. If large-scale plant and expensive machinery are to be purchased abroad, consideration must be given to delivery schedules, availability of parts, ease of maintenance, and compatibility with existing and related equipment. TSE should expect to be involved in all those factors affecting standardization. For example, it should provide a service function to purchasing engineers in the writing of specifications to ensure that the products of new plant and machinery meet any minimum standards laid down by TSE or by other organizations abroad which govern the quality demanded by prospective foreign buyers. The mechanism by which TSE is to be integrated into these processes is a critical governmental problem to which the team did not address itself.

The economic development of Turkey depends largely on the export of its industrial and agricultural products. During the visits to various factories, the team has learned that the majority of products exported

are textiles, iron and steel products, electrical utility parts, cement, fruit and food products.

As Turkey is entering the Common Market, its success in trade will depend on its reputation for product quality. This consideration and price are the most important factors for promotion of exports. Many of the export goods producers, for example Kula Textile, Dyo Paint and Bossa Textile companies, have been aware of the importance of quality and have established their own reputations in the world market for many years. These companies are, in general, equipped with laboratories for quality control and product inspection. However, some basic calibration of laboratory instruments seems to be desirable and there is a possibility for TSE to play a role in this respect by fostering an awareness of such needs and helping to bring the concerned laboratories into contact with sources for validation of their measurements. This could take varied forms such as acquisition and use of SRMs, comparison of instruments with those of other quality control laboratories in Turkey, utilizing the field services of instrument makers, sending instruments to calibration laboratories elsewhere, etc.

It has been noted that the government of Turkey places a great deal of emphasis on exportation. All goods to be exported are to be inspected and certified by designated government authorities. Product sampling and testing are carried out by inspection officials. In some intensively exporting areas of Turkey, such as Izmir and Istanbul, problems have been encountered because of time consuming delays during testing and certification procedures. Increase in expenses and damages to exportable goods can thus result. It is in this connection that the need for regional laboratories and a possible TSE leadership role has been debated. The President of the Chamber of Industry of Adana has emphasized that the decision for the establishment of such a regional laboratory should be subject to a careful study of needs.

2. Consumer Protection

As a society becomes industrialized, both industrial and household consumers utilize an increasing variety and number of complex manufactured products. It then becomes ever more difficult for the consumer to judge the quality of products in respect to their performance, safety, and durability. The consumer may then rely on compliance with standards (either mandatory or voluntary) as an important gage in selecting products for purchase.

To meet this need TSE should continue its noteworthy efforts in this area. As the Turkish economy and industrial base expand, and consumers become more aware of the importance of standards, the demands placed on TSE should be expected to increase dramatically in this area.

Performance-based standards tend to be more effective than specification based standards, both for consumer protection and stimulating industrial innovation. Unfortunately, development of performance standards usually requires a substantially greater effort.

3. Production Control and Industrial Extension Services

An industrializing economy may choose to rely entirely on multinational or foreign companies for technology transfer. Companies providing such services have developed mutually advantageous mechanisms for repayment. Through tax advantages and access to a highly motivated and easily trained labor force and to the market in the country involved they can partially or wholly manufacture and assemble products within that country. Turkey welcomes such arrangements by non-Turkish industrial groups, but is also anxious to foster native enterprises that rely on their own innovative capabilities, capital, and entrepreneurial skill.

Initially, such undertakings are necessarily small when compared with their international counterparts. These smaller Turkish industrial concerns cannot economically maintain a permanent staff of experts in all of the technological specialties relevant to their operations, nor can they always afford all of the instrumentation that may be required for control of their manufacturing processes. Independent consultants are available in most fields of engineering both within and outside of Turkey and appear to offer high quality services. What is lacking in Turkey and other industrializing countries, are readily available consultants and information sources for utilization of the supporting infrastructure of physical and chemical sciences and for the provision of nonroutine testing services. (Routine testing is usually found to pay for itself even within small factories.)

Basic planning in industrializing economies should be concerned with provision of all of these essential services. To insure their availability and quality they are often made a governmental or quasi-governmental responsibility. TBTAK is to assume the main task in Turkey, but at least part of the activity requires close cooperation with TSE.

For competitiveness in world trade, product standards must be met so that overseas buyers can rely on the quality and uniformity of products. Smaller manufacturing enterprises typically experience major problems in applying inspection techniques and rigorous controls. They typically suffer too large a rejection rate for their products, because the unreliable steps in production are either not identified at all or not soon enough to prevent losses. Great savings can be achieved by surveillance of quality, from the raw material through every

manufacturing step to the finished product. Such controls often involve specifications, standards, and test methods on which TSE is expert and could, in many instances, provide reimbursable services. A cooperative plan therefore could be established between TBTAK and TSE whereby the latter would provide problem solving extension services to industry. TBTAK should welcome such cooperation because its services are oriented toward longer term applied research and seem less suited to respond quickly to the problem solving emergencies that are typical of quality control operations.

4. Training in Quality Control, Inspection and Measurement Technology

One of the most important parts of any quality control, inspection or measurement system is the human factor. Adequately trained personnel are required for all of these endeavors whether they employ sophisticated equipment such as automated spectrometers or merely simple dimensional checking equipment such as micrometers. An expanding industrial economy needs to ensure the availability of an adequate number of trained experts by developing training system. This training should consist of both formal technical training (i.e., at a university or vocational high school) and an apprenticeship under an expert to gain actual work experience.

The formal educational system in Turkey is apparently fulfilling its responsibility in providing adequate technical training. Regarding mechanisms for gaining actual experience, TSE has a practice of sending well-qualified staff members to national measurement laboratories in other countries for on-the-job training. TSE is also trying to recruit foreign experts to come to TSE for a period of a year or two to further develop TSE's capabilities and train its staff. These are both excellent practices. Turkish industry also makes use of training assignments to provide experience in utilizing new measurement techniques (e.g., the Rabak Copper Company), but a formal mechanism needs to be established that will allow industrial people to get actual experience in measurement methodology by training assignments to TSE and government laboratories. Salaries could be paid by the industry with the possibility of a government grant to TSE or the government laboratories to provide assistance. TSE could also undertake to provide summer training seminars for industrial staff concerned with standardization activities.

In summary, both formal education and on-the-job experience are necessary ingredients in training measurement and standards experts. At present Turkey has an adequate educational program but needs to provide opportunities for actual job experience and exposure to experts.

5. Statistics and Computer Services

The Team had little opportunity to explore the statistical and mathematical services available to the Turkish economy. Although it planned to visit the State Institute of Statistics, which is almost adjacent to the TSE facility, the Team found it impossible to include it in the Survey agenda. However, Mr. Ralph A. Simmons of the NBS Institute for Computer Sciences and Technology was in Turkey for a considerable part of July 1972 to survey the use of computer technology. His report gives special emphasis to the role of computers in several areas of interest to the Survey.

He found that computer technology has been expanded and used in Turkey without planning and that applications are limited principally to business and statistical functions. A severe shortage of systems analysts and programmers is a major obstacle to effective computer utilization. Education and training is the principal need although some other factors such as the poor quality of local communication lines and the prohibitive leasing cost of long lines may also be limiting factors.

A government reorganization committee recently recommended that government computer services be centralized. This report has not been implemented, but the State Planning Organization has taken over the responsibility for central acquisition. Not having sufficient expertise in-house, it has used the staff of the Middle East Technical University for evaluating acquisition proposals.

A future role for TSE can be identified in the standardization of computer software and hardware. However, in view of the present distribution of experts and responsibilities it would appear desirable to arrange for the processing of such standards with extensive cooperation of universities and government agencies.

The proximity of the State Institute of Statistics provides a potential resource for TSE. The Director of this institute is anxious to offer its computer services to other organizations, and TSE might consider such an arrangement for its future planning, internal management, and data storage and retrieval.

6. Applied Research

The industrialization of a country starting from the basis of agriculture, handicrafts, and cottage industries may be visualized for purposes of discussion as occurring in three main stages: (1) The literal copying of foreign manufacturing techniques by indigenous industry and/or the provision of labor to work in factories capitalized and managed from abroad. (2) Without dropping the basis of agriculture,

mineral and other natural products and native arts and handicrafts, to introduce industries based on practice in more advanced countries but operating under native management and using special adaptations suited to the local scene, e.g., the special characteristics of native raw materials or of the local labor supply or of local consumer tastes, etc. (3) Building on the base developed during the second stage, to achieve operation at the state of the art for as many manufactures and technologies as is economically and socially desirable, i.e., developing and using the most advanced techniques.

In our postulated stage (1) the ideas come from abroad, and the research and development, if any, are performed there. In stage (2) engineering development and applied research are performed domestically; however, these typically are narrowly specialized and of short-range outlook, i.e., looking to the solution of specific, immediate problems. Stage (3) operates from a firm and rather diversified base of type (2) industrialization. A cadre of highly trained scientists must be available, and basic research in appropriate areas is indispensable.

In economic terms, stage (1) is one of economic subordination, stage (2) can satisfy basic domestic needs, reduce dependence on importation of manufactured goods, and capture certain export markets where pricing is favorable, while stage (3) permits penetration of world markets by virtue of quality and uniqueness for those products in which the country sees fit to specialize.

The NBS-AID team visualizes Turkey as being well launched into stage (2) and that an extended and fruitful period of further development and diversification at this level will ensue. Stage (3) is thought to be attainable in certain selected technologies, in view of intrinsic qualities and trainability of Turkish labor and the high quality of its best technologists, but this seems too distant to engage major attention in this survey.

The above impression is based on the team's short tours and visits. Applied research of the stage (2) type was observed, e.g. at the Sugar Research Institute (industry supported), the Mineral Research Institution (government supported) in Ankara, and the laboratories of the engineering departments of Middle East Technical University. These laboratories clearly are active and enthusiastic, and we would guess that they are effective in supplying this type of applied research. It appeared from our impromptu discussion with officials of the Scientific and Technical Research Council of Turkey (TBTAK) that this government organization would also focus strongly on applied research at its as yet unfinished research center near Istanbul.

It would be premature for the team to comment on the applied research performance of TBTAK, since that organization has not yet reached its planned operating status and the team had only a brief exposure to its program. Nevertheless, one can say that it appears to be well conceived and structured for conducting the applied research needed by Turkey to complement the special-mission research centers supported by certain industries and other agencies of the government. Specific projects that were mentioned in the visit to TBTAK were of the type that can be immediately useful, e.g., amelioration of air and water pollution, development of smokeless fuels, avoidance of mine explosions, and development of voltage regulation devices.

The team needs only to address the following question: Given the framework of Turkish applied research activities that has been portrayed at some length above, what kind of applied research, if any, should be included in the TSE program? In answer to this question, the team recommends that TSE should indeed make plans to eventually undertake limited applied research. Consistent with the high degree of specialization and organization already existing or planned for Turkish applied research, it is the opinion of the team that applied research in TSE should be specialized towards the improvement of laboratory procedures for product testing and the development of new product test procedures as they may be needed.

7. Operations Research

Operations research is a field of science concerned with developing ideas and methods to improve decision making. Decision making involves the identification of values, objectives, priorities, means, resources and constraints under conditions of certainty or uncertainty for short- or long-range local or global purposes. Since organizational structure is an important aspect of the decision process, it is also necessary to consider information flow, level and type of participation and the socio-economic framework.

Operations research relies heavily on certain branches of applied mathematics including linear and nonlinear programming, stochastic programming, queing theory, search theory, inventory theory, scheduling, decision and value theories, game theory, network flows, optimization in integers, etc. However, evolving semantics have blurred any real differences between the use of terms such as operations research, systems analysis, technical analysis, and multidisciplinary problem solving and, in general practice, most of these are lumped into what is usually recognized as the "systems approach." The latter is a poorly defined hybrid of operations research, statistical and modeling techniques, computer programming, human factors, engineering and other applicable tools. These are used to obtain understanding of problems

involving multiple phenomena, i.e., understanding not only of the individual phenomena but also of their significant interactions.

The systems approach has had its most heralded successes in the handling of complex technical tasks (telephone communications and ICBM weapons) but is being increasingly applied to such problems as hospital operation, integrated information systems, factory design, etc. The field is currently being subjected to considerable reassessment, and some of the principal systems approach contractors in the U.S. have come under criticism.

Turkey is certainly aware of operations research methodology, although the Team noted no programmed effort in industrial plants for sophisticated application. In the Middle East Technical University both the Department of Mathematics and the Department of Industrial Engineering offer courses in operations research. The latter department also has courses in systems analysis, human factors engineering and simulation. Our visit to the Scientific and Technical Research Council of Turkey (TBTAK) revealed its intention to promote operations research as a major staff activity.

TBTAK's OR Unit at present is limited to about a dozen specialists but has worked on plans for some major engineering projects including the Keban Hydroelectric Facility. It has also produced studies for state enterprises such as the Sumerbank Purchase-Sale Institution and for the State Planning Organization. Since 1967 the Unit has been lodged in the Middle East Technical University where it has received support and close cooperation from the University faculty.

The Team concluded that the operations research field was receiving adequate recognition and promotion in Turkey at the present time.

8. Technology Assessment, Forecasting and Transfer

Technology assessment (TA) may be defined as the systematic study of the effects on society that may occur when a technology is introduced, extended or modified, with special emphasis on the impacts that are unintended, indirect and delayed. In other words, technology assessment aims to look beyond the short-range cost-effectiveness of new technology, in an attempt to assess the significant potential side effects. It should be differentiated from other new methodologies used to optimize the socio-economic benefits of technology, namely technology forecasting and technology transfer.

Technology forecasting (TF) is the prediction of the time of appearance and character of new devices, materials, and processes. It should be stressed that the output of TF is data about technology--not a

decision about management alternatives (for this see the preceding Section, Operations Research). In addition, no TF methodology has been presented with claims of predicting "breakthroughs." TF may, however, point to the need for a "breakthrough" or the likelihood of technology reaching a threshold of great technical significance.

The term Technology Transfer covers the process of matching solutions in the form of existing science and engineering knowledge to industrial or commercial problems.

Many evidences of the "dark side" of technology were observed by the Team during its stay in Turkey. Pollution of the air by industrial processes was common, the Bosporus was being used routinely as a dumping area even close to shore, and solid waste of all types was scattered in the industrial areas of the large cities. Turkey industrializes for the most part by the introduction or extension of existing technologies rather than by modifying technologies or developing basically new industries. As a result she has available the mass of data and experience that has accumulated in the developed countries for assessing technology. In any country that has the well-being of its citizens as a major goal technology assessment is almost inevitable and Turkey will be no exception. However, the problems are so broad and pervasive that no single organization can be expected to provide all of the necessary expertise, specialists and disciplines. Probably the main thrust in TA must evolve as a function of the Federal Government or receive programmatic direction from that source. TBTAK might be considered an obvious coordinating body. Universities, government departments, private research organizations, the industrial establishment and TSE would contribute and function within this coordination.

As a methodology, Technology Forecasting is just past its infancy. James R. Bright in "A Brief Introduction to Technology Forecasting" (Pergamon Press, 1972) warns that:

- Broad and scholarly development of rigorous techniques for forecasting technology is just beginning.
- Hypotheses behind many approaches are largely unproven.
- With rare exceptions, comprehensive and consistently based time studies of technological parameters have not been compiled. The data base for technology has not been accumulated or organized as it has been in economics or census statistics.

As a result technology forecasting must be used with caution. The distinction between predictions of experimental technological accomplishments and predictions of technology that will reach wide

social adoption is especially critical to sound forecasting. Failure to make this distinction is the major source of confusion and error in forecasting.

As a result of all these caveats it would appear that TSE would be ill advised to invest its limited resources in this relatively unproven field. For the present it should be sufficient for Turkey to be cognizant of the relevant literature and perhaps use consultants to provide forecasts in a few fields of particular and urgent interest.

In addressing the final element in this section, technology transfer, it would appear that many of Turkey's heavy and high technology industries, at least initially, purchase technology through joint ventures or license arrangements. This technology transfer appears reasonably effective within existing constraints. However, the pressures for increasing industrialization in Turkey may require more than the present ad hoc operation. Although METU's technical library is a significant resource, other information reserves would undoubtedly be useful. The National Technical Information Service of the U.S. and other technical documentation centers should be made available for referral. For the present, lists of documents, abstracts and procurement information should be compiled with a view to developing a core for a National Library of Science and Technology. Alternatively, specialized technological information could be accumulated and distributed by agencies having specialization in different areas. Obviously, TSE would be a candidate for establishing such a specialized information bank in the standards field.

9. International and Regional Contacts

Given the character and mission of TSE, its principal foreign contacts must be in international standardization bodies such as ISO (International Organization for Standardization) and IEC (International Electrotechnical Commission) and with national standardizing bodies of other countries, especially those in the Common Market countries, the U.S.A. (ANSI, ASTM, ...), and the Eastern bloc. These contacts are important in order to draw upon the body of product standards already in existence or being developed elsewhere and in order to promote consistency of Turkish standards with those of countries with which import-export relationships exist or are desired. TSE must also be cognizant of related activities, such as those of I.O.L.M. (International Organization for Legal Metrology). (Apparently the certification of export products for conformity to foreign standards falls outside the responsibilities of TSE and is performed by laboratories of the Ministry of Commerce. The itinerary prepared for the study team was such that the team was unable to form a trustworthy opinion about the adequacy with which this function is performed.)

At the international level TSE is in close contact with external standardizing bodies that we have identified above. TSE is highly regarded, which will facilitate future arrangements for mutual recognition of product certifications.

On the regional scene, TSE should work with the standardizing bodies of other Middle Eastern countries to assure that artificial barriers to trade do not arise due to differences in product standards. There did not appear to be any serious problems at the regional level at this time. The team was informed that the TSE mark is accepted in Iran, Pakistan, Iraq, Bahrein, Lebanon, Syria, Saudi Arabia, and some of the North African countries.

10. Information Services and Diffusion (including Standard Reference Data)

TSE distributes all Turkish standards and maintains a collection of standards of international standardization bodies (ISO and IEC) and has close collaborative links with other national standardization bodies such as ANSI and NBS in the USA. TSE is able to draw freely on the information storage systems of these organizations. Thus there can be no doubt that TSE is the most logical and effective focal point for standards information activities. If the staff were strengthened somewhat, especially for comprehension and abstracting from foreign language standards, TSE could fulfill the standards information function entirely satisfactorily. Then, it would only remain for industry and government agencies to make fuller use of this valuable resource.

Technical information in general is a very wide field and TSE is careful not to expend funds for a comprehensive general scientific and technological library or to furnish information on all kinds of industrial processes. Naturally the TSE staff will often need specific information in all kinds of scientific and industrial fields that are not adequately covered in the handful of journals and textbooks they might individually keep near to their desks. TSE staff is therefore dependent on the use of good technical libraries such as the one at METU, reasonably close to TSE.

There is one class of specialized technical information which is closely related to maintenance of material and instrumental standards. This is the class known as Standard Reference Data. Engineers, technicians and designers often need the most reliable property values of the ever increasing number and variety of materials and chemicals used throughout trade, industry, medicine, agriculture, architecture, etc. Turkey, as its technological and manufacturing base expands, will need to have a central point of contact for this type of information.

The optimum organizational site for the dissemination of such knowledge as a service to Turkish industry, government and the technical public needs to be considered by those responsible for central planning of science and technology.

11. Professional Societies

In Turkey where some of the universities have necessarily small departments of science and engineering, where industrial enterprises typically employ just one specialist in any one field deserving of a full time staff member and where even research institutions employ only two or three specialists in any one discipline, the professional societies (referred to there as "chambers") mentioned in Section VI play a very special role. As is made clear in that section, the range of organizations described as professional societies in Turkey is somewhat wider than is customary in the USA. They provide meetings, discussions and cross-fertilization of ideas between professionals of similar background who otherwise would be in such isolation as might affect their competence and ability to keep up with new developments in their field.

In fact, Turkish professional societies appear to be effective in providing the necessary forums of contact. For TSE, professional meetings provide an excellent opportunity for dissemination of the principles of standardization. TSE should consider inviting society meetings to its Ankara laboratories and providing illustrated presentations at meetings in other districts. Company representatives might be invited to discuss production and quality control problems and successes directly related to the interests of the given society.

Other important contacts with professional societies have been utilized by TSE. Thus it obtains information on potential technical members of standards writing committees and professional critics of draft standards by cultivating collaborative relations with such societies. It is noteworthy that such societies provide some of the funding for TSE.

12. Publications and Publicity

Besides the TSE standards, the Institution has published a number of informative brochures including a description of the certification mark scheme, the history of TSE and the role of standards in the industrial economy. It also distributes a newsletter to its members and other interested members of the standards community. Most of the brochures and other publications, including the Standards themselves, appeared to be in an attractive and readable format. The desirability of a more technical periodical relating to standards and

testing was briefly discussed on two occasions by the Team, but little enthusiasm was generated. Since both English and other-language publications of this class are available in Turkey, there seems to be little justification for TSE to expend resources for this purpose.

In spite of the above activities the Team was told on numerous occasions that TSE is unfamiliar to a large portion of the Turkish populace and is in serious need of a campaign for educating the public on the importance and impact of standards and the operations of TSE. Several of the plant managers and owners indicated that their reluctance to adopt the TSE mark was due to the conviction that the latter was less well known than their own names or trade marks.

TSE is aware of the necessity of public awareness of its work and is preparing to provide course materials to the schools. Other media for disseminating the standards message should also be examined. For example, the Indian Standards Institute (ISI) uses newspaper releases, general interest magazines, radio, television and even billboards to familiarize the country with its work and its certification mark. TSE should study the Indian experience with a view to adopting some of these tactics.

Appendix 1

Itinerary of Survey Team

October 14, 1972	(1)	Reception by TSE President
	(2)	TSE Laboratories
	(3)	World Standards Day Celebration
October 16, 1972	(4)	Turk Tractor Plant, Gazi
	(5)	Sugar Refinery and Farm and Research Institute
	(6)	Meetings with Professor Can
October 17, 1972	(7)	U.S. Agency for International Development
	(8)	Middle East Technical University (METU)
	(9)	Mineral Research Institution (MTA)
October 18, 1972	(10)	Minister of Industry and Technology
	(11)	Planning Meeting with Survey Director
October 19, 1972	(12)	President Chamber of Industry, Izmir
	(13)	Metas Steel Mill
October 20, 1972	(14)	Goktepe Plastics
	(15)	Dyo Paint and Printing Ink Company
	(16)	Kula Textile Mills (wool)
October 21, 1972	(17)	Bosporus University
	(18)	Research Center for Construction Materials
October 23, 1972	(19)	Rabak Copper Mills
	(20)	Atli Chain and Needle
	(21)	Mensucat Santral Textiles
	(22)	Kalekalip and Electroporselen
October 24, 1972	(23)	Further Discussions with AID, John Fry, etc.
	(24)	President, Chamber of Industry, Adana
	(25)	Bossa Textile
	(26)	Packing House
October 25, 1972	(27)	Final Session with Survey Director
	(28)	TBTAK
October 26, 1972	(29)	Team Discussions

October 14, 1972 Meeting with President of TSE

The Turkish Survey Director and President of the Turkish Standards Institute (TSE), Professor Dr. Tarik G. Somer, received the team, and

there ensued a preliminary discussion of the itinerary and the agenda of the survey. Professor Somer informed the team that a study of the operations of TSE was being made by a Turkish group under the chairmanship of Professor Can of the Middle East Technical University (METU). A foreign study originally had been considered but was rejected because of the excessive cost. The Survey Team made an appointment to meet with Professor Can.

The fine supporting facilities and program details were arranged principally by the Secretary General, Mr. Velid Isfendiyar, ably supported by numerous staff members. Special mention should be made of:

Mr. Fuat Yucesoy, who was on the NBS/AID team in Ecuador and Korea

Mrs. Aytel Ustanoglu, responsible for international relations

Mr. Taner Berkun, public relations chief and organizer of the World Standards Day celebrations

Dr. Argun Dagcioglu, Director of the TSE Chemical Laboratories and former NBS guest worker.

A tour of the TSE laboratories followed.

October 14, 1972 TSE Laboratories

The product testing laboratories of TSE are well housed and contain a large variety of equipment for product testing. Following is a partial listing of facilities shown to the Team:

Perkin-Elmer IR analyzer used for chemical analyses, e.g., of rose oil

Gas chromatography

Flame ionization detection equipment

Fibrous materials laboratory with a variety of mechanical testing devices including an Instron machine. Testing of color fastness, dimensions, wear, flexure.

Metallography - specimen preparation - polishing - heat treatment - hardness

Plastic tiles and tubing - indentation - electrical insulating quality - abrasion resistance

Mechanical testing of soil, concrete, cement pipe, bricks, tile, and other ceramic ware.

Testing of steel reinforcing rod and cable anchors - Tinius-Olson machine - proving rings for calibration of T-O machine

General mechanical testing - hardness-impact-fatigue

Lamps and switches - life testing - one-meter and two-meter integrating spheres - both incandescent and fluorescent lamps can be tested.

Battery testing

The institute has a capability for constructing special equipment as needed, e.g., we were shown a simple and effective hydraulic tester of bursting strength of cement pipe.

The laboratories are very much underutilized at present. Four young chemical engineers educated at METU operate the entire range of equipment. Unless the workload is increased it will not be feasible to expand the staff and increase its expertise via specialization. A considerably expanded use of Standard Reference Materials and calibration services from national laboratories of other countries could increase confidence in the TSE testing operations.

October 14, 1972 World Standards Day

An elaborate celebration of World Standards Day (so designated by the International Organization for Standardization, ISO) followed with 200 guests. Prepared speeches included two by Andrus and Peiser that were delivered in Turkish (English versions are appended). A message from the NBS Acting Director was also read in translation. Various manufacturers were given quality mark certificates, and a banquet followed precisely at sunset.

October 16, 1972 Visit to Turk Tractor Plant, Gazi

An overview of the company operations was given by the manager, Mr. Halil Kaya. The company, in which Fiat has a 25 percent interest, produces about 10,000 tractors (45 and 60 horsepower models) annually. The company was originally a subsidiary of Minneapolis-Moline (White Motor Company), but the interest of the parent company shifted to more powerful machines that are less readily marketed in Turkey. The relationship was dissolved by mutual agreement in 1962 with the stipulation that Turk Tractor should not affiliate with any other U.S. company! The current gross annual business is 600 million TL (about $40

million). The company is able to undersell imports of similar horsepower. There are three other tractor companies in Turkey: Ford, BMC, and Massey-Ferguson, each producing about 10,000 tractors annually. It is interesting to note that the Ford tractor is made by a state factory. (Turkey has a mix of state and private manufacturing in other areas as well, e.g. textiles.) The state factory was said to be an uncompetitive holdover from an earlier time when artificial support for domestic manufacturing was needed; it remains alive because there is a seller's market at present. About 50 percent of the parts for Turk tractors are now made locally. This proportion will increase to 70 percent when a plant expansion which is currently underway is completed. The Union of Mechanical Engineers is responsible for evaluating the safety of tractors produced in Turkey.

The plant foreman then conducted a tour of the factory and test laboratory. The laboratory performs chemical analyses and can measure hardness, tensile strength, and Charpy impact. The chemical analysis of metals was done by wet chemical means with no SRMs being used. The team was told by TSE that a mistake had been made by this laboratory in the past on chemical analysis acceptance testing of 2,000 tons of imported steel. The tractor company was saved from serious legal action by an analysis at TSE using NBS-SRM's supplied through the AID program which showed the steel to be made to specifications. However, the Tractor Company still feels that SRMs are unnecessary for wet chemical analysis.

The company has no trouble in keeping engineers or quality control staff, but has lost skilled workmen to Germany.

The production facilities include machine shops with some numerically controlled machines, a paint shop, areas for engine acceptance with a two hour run-in test, a foundry, and a modern assembly line for final assembly and quality control. Fiat specifications and standards are followed. Occasionally, the facilities of METU or Fiat are used for special tests. The accuracies of various reference gages used in the plant rest upon the manufacturer's assurances; recalibration is rare.

October 16, 1972 Visit to the Etimesgut Sugar Refinery and the Sugar Institute

The team visited the large complex containing the Etimesgut Sugar Refinery, the Sugar Institute, a plant producing large machinery for both the sugar industry and other industries, and a demonstration and experimental farm. The group was greeted by Mr. Osman Bozok, the Director of the Sugar Institute who presented an excellent overview of both the Sugar Institute and the Turkish sugar industry, totally a state enterprise. There are 17 affiliated refineries. All of Turkey's sugar

consumption is satisfied from domestically-grown beets. The industry follows TSE standards for sugar which are compatible with those of the World Health Organization and ICUMSA (International Commission for Uniform Methods for Sugar Analysis). ICUMSA's chairman and Secretariat are located in England. The Commission meets every four years, with the next meeting scheduled for Turkey in 1974.

The Sugar Institute carries out R&D and educational activities for the total sugar beet industry, from the farmer to the refinery. The Sugar Institute also provides a central quality control laboratory to maintain compatibility among the various factory control laboratories and to provide bacterial control. The Institute has an annual budget of $850,000. Its professional staff includes 40 people with advanced degrees. Students use these facilities to do M.S. theses on problems in sugar refining, quality control, water purification, process control, etc. The Institute receives 165 periodicals related to the sugar industry and provides translation services. Much of the plant and laboratory equipment was of German origin, and the Director and some of his staff were German-trained.

The sugar factory appears to be modern and is mechanized but not highly automated. It was 65 percent locally built. The factory quality control lab used ICUMSA SRMs for quality control. Measurement methods include colorimetry (both visual and electronic) and ash content.

The experimental and demonstration farm appeared to be well run and a very useful educational and research endeavor aimed at increasing agricultural output and improving the quality of life for farm workers.

The factory for producing machinery is undergoing a large expansion program. It is equipped with large lathes, milling machines and rolls and a large annealing furnace. It has produced pressure vessels and custom machinery for food processing, cement making (rotary kilns), and oil refining. It uses Turkish carbon steels; we saw no high-alloy special steels or aluminums. It was said that welds were examined by x-ray, but the team was not shown the equipment. The shop looked busy and businesslike. Professional salaries throughout the sugar complex were stated to be about 20 percent below those in private industry resulting in a tendency in the last few years for professional people to seek higher paying jobs in the private sector.

All in all, the complex appeared to be well run and effective.

October 16, 1972 Can Committee

As the last activity of the day the Team met with Professor Can, Chairman of the committee evaluating TSE operations.

Professor Can was completely open and frank in discussing the work and tentative conclusions of his group. However, since his report has not been officially delivered to TSE, it would be inappropriate to provide details of this confidential information. Some general aspects of committee deliberations were included elsewhere in this report (Section VII).

The Can Committee has limited itself to making proposals whose implementation is possible under the present statute establishing TSE. This eliminates any consideration of structures specified in the statute, i.e., the General Assembly, Board of Governors, etc., and fairly well confines the Committee's considerations to the operating staff and standards implementation procedures. In general, the Can Committee endorses increasing staff support services, streamlining the laboratories, improving communications with outside groups and improving its salary levels. In many areas its thinking parallels the initial impressions received by the Team. The interview was extremely valuable to the Team and a tribute to the objectivity of the TSE management.

October 17, 1972 U.S. Agency for International Development

The Director of the U.S. AID Mission received Andrus and Peiser in the presence of Dr. Kenneth W. Kauffman, his deputy, Miss M. Belcher, and Mr. W. Nance. Andrus and Peiser explained the need for standardization and measurement services in industrializing economies. The extent to which TSE could or should take wider responsibilities beyond standards writing was considered. The process of arriving at decisions on such problems through an in-depth analysis should be expected to be a slow and evolutionary process. The need for calibration services was recognized and TSE was considered to be an appropriate candidate organization to take responsibility for a system of accredited test laboratories.

October 17, 1972 Visit to Middle East Technical University

The team visited the campus of the Middle East Technical University (METU). The host was the President of the Board of Governors of TSE, Professor Dr. Tarik G. Somer who is a professor in the Department of Chemical Engineering of METU. The University, founded in 1956, has four colleges: the Faculty of Administrative Sciences, the Faculty of Architecture, the Faculty of Arts and Sciences, and the Faculty of Engineering. The group was given a general tour of the excellent new facilities including the well-stocked central library. METU conducts all courses except history in English. It has a teaching staff of 700 and a student body of 7,000. Nineteen Ph.D. degrees were granted in 1971-72 and over 1,000 M.S. degrees. The team was formally greeted at METU by one of the Assistant Presidents. The Assistant President was

unaware of the AID supported "Blackledge Report" on METU. He explained that the report, most likely, was the concern of another Assistant President of METU.

The group was then given a very quick tour of the Engineering laboratories including the metallurgy, chemical engineering, and mechanical engineering laboratories. By far, the most impressive was the Unit Operations Chemical Engineering Laboratory headed by Dr. Somer, himself; it is an outstanding facility by any standards. Current or recent laboratory research includes the liquid-liquid extraction of salt from sea water, studies of fluidized beds, and two phase heat transfer. There are 150 graduate students in chemical engineering. The mechanical engineering laboratories contained a metrology laboratory (no climate control), a nuclear engineering laboratory, an engine and turbine laboratory, a heating and refrigeration laboratory and a mechanics laboratory. The Metrology Laboratory included a Talysurf-4, Zeiss gear lead checker, gear tooth span and thickness indicator, and precision micrometers. Some product testing is done at METU when there is a stringent requirement for testing (e.g., government procurement) provided METU has the facilities to do it. The metallurgy laboratories have recently been completed. They contain heat treating furnaces (including vacuum types), microscopes (an electron microscope is to be ordered soon), x-ray diffraction equipment, melting and casting facilities, extractive metallurgy equipment and equipment for fatigue, tensile, and impact testing. A staff member on leave from METU is doing metal corrosion research at the University of California at Los Angeles; he will expand the corrosion program on his return.

The research efforts of METU could benefit by receiving NBS-Standard Reference Materials. These would include, for example SRM's for sulfur in oil, plating thickness, gun metal alloy, radioactivity, and retained austenite.

To sum up, METU is a rapidly growing dynamic school with excellent facilities and with a curriculum and research program responsive to Turkish needs.

October 17, 1972 Visit to Mineral Research Institution (MTA)

The headquarters is a large administration and laboratory complex located near the Middle East Technical University. It is an integrated organization for mapping and exploring the ores and mineral resources of Turkey (equivalent to a geological survey) and for evaluating, by research if necessary, the possibilities for exploitation of deposits and fossil fuel. Laboratories are well equipped for the identification, separation and processing of minerals. Total staff numbers 3,000 including 1,000 professionals. MTA facilities are used for graduate

thesis researches, and trainees are accepted from other organizations. The staff has participated in preparation of Turkish Standards, e.g., for vitreous ware. The budget is about U.S. $10 million.

Interesting projects were described relative to resources of copper, iron, lead, zinc, bentonite, boracite, chromite, perlite, phosphates, lignite, uranium, petroleum, and geothermal energy by the principal host, the MTA General Director. During the laboratory visit the team received the impression of excellence in many areas, of widespread use of NBS standard reference materials and of determination to ensure effective future natural resource management in Turkey with strong participation by private enterprises.

The analytical labs are equipped with both an x-ray fluorescence and a spark source emission spectrometer. More SRMs will be needed to utilize this equipment fully. MTA will send a list of needed NBS SRMs to TSE. (MTA has an up-to-date NBS SRM catalog.) This list should include SRMs for differential thermal analysis, thermal expansion, triuranium octoxide, sulfur in oil, and sulfur and mercury in coal, along with various steels.

October 18, 1972 Visit to Minister of Industry and Technology

The Survey Team met with His Excellency Mesut Erez, Minister of Industry and Technology, following introductions by Professor Somer. Formal greetings were exchanged and the importance of standardization was discussed. At the close of the meeting Professor Dr. Somer requested the Minister's assistance in obtaining increased financial support of TSE activities, and the Minister promised to give his aid. (Embassy and U.S. AID officials were informed about this interview in advance but they chose not to participate.)

October 18, 1972 Second Planning Meeting with Survey Director

Dr. T. Somer received the entire team for a planning session at which the principal problems discussed were (1) adequate printing facilities, (2) calibration service, (3) packaging laboratory, and especially (4) provincial test laboratories.

A second round of talks with Professor Can was held, primarily to permit Mr. Andrus to exchange views before his early departure to attend the IOLM General Conference in London. Among other things, Mr. Andrus expressed his opinion that the laboratory capabilities of TSE needed to be strengthened in order to permit it to enter as a full partner into bilateral working arrangements with standards institutions of other countries for the purpose of mutual acceptance of each other's quality certifications and product tests. He also pointed out that the role of

TSE in testing products for exportation needed to be clarified, the utilization of the available facilities increased, and the technical expertise of the staff augmented. He felt that the certification program is already extremely effective.

October 19, 1972 Visit to Izmir Chamber of Industry

The President of the Chamber remarked that he felt well satisfied with the mission of TSE and with its operations as far as they went, but that the laboratory testing services available in the Izmir region were inadequate. Laboratories do exist in the Izmir region for agricultural produce, health services, and military procurement but not for general manufactures. Also, there is some control of local weights and measures (e.g. scale checking) by the Ministry of Commerce, but these services do not include industrial measurements. The President endorsed the idea of establishing a regional laboratory for testing the products of industries in the Izmir area.

October 19, 1972 Visit to the Metas Steel Plant

The Team visited the Metas Steel Plant in Izmir, a private-sector company operating to some extent in competition with the government iron and steel enterprise. The NBS/AID Team was greeted by the plant manager, an impressively capable mechanical engineer. This was followed by a greeting from the company president.

The plant remelts scrap steel and produces mainly low alloy steel (equivalent to types 1010 to 1080), reinforcing rod, and steel for other industrial uses. Most of the products carry the TSE mark. The plant has an output of 80,000 metric tons of steel per year with most of the scrap steel being imported from the U.S.A. (high quality scrap is used at $50 per ton). The plant utilizes electric furnaces, an innovative continuous casting process, and argon-atmosphere heat treating. The quality control laboratory was excellent; it utilizes an automatic optical emission spectrometer and a pneumatic tube for rapid analysis of each melt. NBS-SRMs are being used for calibration of the chemical analytical instruments. Mechanical properties are also checked closely.

The plant is undergoing a major expansion to increase production from 80,000 to 300,000 metric tons per year, to produce strip, I-beams, and other shapes not presently being made, and to move into the production of alloy steels. Design for the plant expansion is being done in-house by the plant manager and his staff. The team felt this to be a very impressive undertaking.

The company will need many new NBS-SRM's in the future to assume the quality control of the planned alloy steel production.

The plant has no trouble in retaining employees, as the working conditions and treatment of the entire staff apparently are good. Professional pay was said to be about 30 percent higher than for corresponding jobs in the Turkish Government.

To sum up, this plant appears to be a profitable operation, producing a quality product, and a good place to work.

October 20, 1972 Visit to Goktepe Plastic Pipe Company

The Survey Team visited the Goktepe Plastic Pipe Company in Izmir. The team was given a general overview of the company and then was conducted on a plant tour. The plant buys its polymers (PVC and polyethylene), fillers and other raw materials from Turkish companies. The raw polymers come from Petkim, the Turkish state petrochemical industry which both produces and imports them. Goktepe accepts these without test. The materials are blended and then formed into many types of pipe in diameters up to about one foot in a continuous operation. Most of the products bear the TSE mark. The company management expressed the desire to see the TSE Standards for plastic pipe made mandatory to insure the removal of poor quality pipe from the civilian market. (The TSE mark is already required on plastic pipe for government construction.) The quality control laboratory was equipped with ovens for heat testing, mechanical impact testers, dimensional gages, water absorption testing, and a hydrostatic pressure test at various temperatures. The laboratory appeared to be adequate to control product quality. At the end of the operation, scrap plastic from the plant is recycled into lower quality, nonpressure pipe.

The plant appeared to be well run with modern German equipment. Its Director is German trained. It offers a quality product and good working conditions.

October 20, 1972 Visit to Dyo Paint and Printing Ink Company

This large modern paint and printing ink company with associated tin can manufacturing is under license from the Danish company of Sadolin and Holmblad with factories also in many other countries ranging from West Germany to Ethiopia. The high technology used in this plant is introduced via the Danish plant manager who is responsible also for the development and process laboratories. Each Danish expert furnished by the parent company serves for a two-year period. Product qualities but not necessarily the trade-names are identical between the subsidiary companies in different countries. One of the problems of standardization is in the Turkish market requirement for sale on a weight basis. An unscrupulous manufacturer could add a cheap dense filler to increase weight without improving the effective paint

quantity. Volume dispensing would have the advantages of corresponding more nearly to covering power and of enabling paints of different densities to be packed in cans of the same size without introducing undesirable free air space. It is not customary in Turkey to specify contents or coverage on the labels of paints. Our host stated that he felt that the TSE mark would be desirable as an assurance to customers. Regarding quality control, we noted Thwing-Albert Inkometers and test equipment for viscosity, weather exposure simulation, gloss, and hardness. It appeared that the level of ultraviolet light exposure in the weather simulator was monitored by fading papers; however, communication on this point was uncertain. Generally German and ASTM standards are used for guidance.

An interesting paradox appeared in a peripheral discussion. It was remarked that there was an unnecessarily large number of sizes of letter and document paper being used in Turkey, to which it was replied that paper is a state industry and therefore not receptive to pressures to standardize!

October 20, 1972 Visit to Kula Textile Mills

Kula Textile Mills produce woolen fabrics including worsteds. Another plant of the same company located some two and a half hours drive away produces hand-made rugs which receive final finishing, cleaning, and warehousing at Izmir. The high quality of their hand-made rugs may be inferred from typical prices quoted as 1,200 Turkish liras per square meter (about $70 per square yard). They use a considerable amount of Australian Merino wool. Turkish wool is inferior at present and difficult to handle, but the Merino breed is being raised more and more in Turkey. They also make wool-orlon fabrics and produce orlon and cotton velvets. Their machinery was largely Italian but with some of German, English, and French manufacture. A recent rise in the price of raw wool has priced this company out of the export market. The company is 100 percent privately owned.

Regarding quality control, Kula consults the TSE for information but does not attempt full compliance. (It is not mandatory at present.) They feel that they are already well known and the possessors of an assured position. To invest in the TSE mark would not be cost effective in their view, as TSE is not well known to the public. They feel that it should be made the subject of an educational and public relations effort. (Mr. Isfendiyar interjected that TSE does plan an educational effort in the schools.)

They do not test for color-fastness but buy their dyes from abroad (West Germany, Britain and Switzerland) on the basis of the performance

and reputations of the suppliers and the company's own past experiences with them.

They remarked that competition from smaller enterprises with inadequate quality control is bothersome, but they did not draw the seemingly obvious conclusion that use of the TSE quality mark would enable potential customers to differentiate their product from ones made without proper quality control.

October 21, 1972 Visit to Bosporus University

This visit was arranged on the spur of the moment as a substitute for two factory visits which could not be made. We were able to meet with Mr. Mumin Tansever, Assistant Director for Student Affairs and Dr. A. S. Yalcin, Chairman of the Civil Engineering Department. Bosporus University is the former Robert College, which existed for many years with American administration, faculty and financial support. Our two mentors from TSE, Velid Isfendiyar and Fuat Yucesoy, received their undergraduate training there. The institution was nationalized about two years ago.

It is planned to expand the graduate school until it about equals the present size of the undergraduate school. Thus, the university will remain a small but elite institution. (No more than 2,000 students of all kinds are to be accommodated.) The graduates who attend graduate schools in the U.S.A. average about 3.4 grade points on a scale of four. There have been no failures of such students in the U.S.A.

We inquired about relationships between the university and Turkish industry and were told that attempts had been made to assign students to attack industrial problems as theses, but that it had been found difficult to bridge the gulf between industry and academia. Turkish industry was said to feel that it did not need R&D and was satisfied to continue producing on foreign patterns. Similarly, the university has no R&D contracts from industry, and there is little or no faculty consultation for industry. The Team was unable to examine this question from the point of view of the industries involved.

It was remarked that government agencies feel no commitment to develop domestic engineering talent and tend to seek safe solutions to engineering problems by hiring foreign firms--hence the paradox that university staff received more consulting work from foreign firms carrying out large engineering projects under government contract than from the government directly. Faculty pay is low (800 to 2,000 Turkish liras per month), and there is a "brain drain." The feeling was expressed that the government is insufficiently aware of the importance of university faculties of scientists and engineers to the future

development of the country. This is manifested, for example, in the small and diminishing number of full professorships allotted to the state supported universities. We saw teaching laboratories in chemistry and chemical engineering but no research laboratories. In subsequent plant visits around Istanbul, utilization of the Technical University of Istanbul for testing and for staff consultations was mentioned, but there was no such mention of Bosporus University. Thus it is possible that a visit to the former would have been rewarding.

October 21, 1972 Visit to the Research Center for Construction Materials

This Center is a private undertaking. Its functions are to exhibit new industrial products manufactured in Turkey. Thus its title is somewhat of a misnomer, as the Center does not have a research program at present. Following is a brief description of the industrial exhibition stands.

1. Ytong of Istanbul demonstrated an outside cement coating applied by spray and adhering to bricks, cement, wood, etc. The same company also builds low-cost prefabricated houses and apartments of modular construction.

2. Yener Celik of Istanbul--furniture, especially shelving and display cases for shops.

3. Tamsan of Istanbul--wood and glue for parquet, construction, and packaging.

4. Canakkale Seramik A.S. of Istanbul--wall tiles.

5. Kale Porselen of Istanbul--porcelain insulators.

6. Izocam of Istanbul--cut straw insulation for walls and roofs.

7. Semenkat of Istanbul--other wall insulation.

8. Kamping Izzet Isman of Istanbul and Ankara--plastic Venetian blinds and balcony railing.

9. Yapi Malzemeleri Endustrisi Ltd. of Karakoy--office files.

10. and 11. Halifleks Sanayi Ve Ticaret A.S. of Istanbul had colorful vinyl flooring and floor tiles made from polyesters and polyamides (also detergents), not to be confused with Kaleflex (Istanbul) floor tiles associated with Kaledekor wall tiles.

12. Hasel of Kararmaz--door hardware.

13. Eczacibasi Seramik Fabrikalari A.S., (trade name VITRA)., Istanbul--a full range of sanitary ware.

14. Dokumay of Istanbul--fixtures of enamel on steel and cast iron.

15. Karvin of Istanbul--vinyl auto seat covers.

16. Farglas of Istanbul--transparent acrylic sheet.

17. Turkiye Sise Cam Fabrikalari A.S. had a very attractive glass products exhibit including frosted glass panels and an asbestos-containing strip for mechanical, moisture, electrical and mechanical protection and large industrial rolls.

18. Kaplamali Bantlar (trade name of Borusan of Istanbul)--brass, nickel and copper strip.

19. Betebe of Topkapi--mosaic tiles.

20. Bik Asbest Borulari--asbestos pipes.

21. Pimas--plastic pvc pipes (Istanbul).

22. Arcelik--refrigerators bearing the TSE marking.

23. Philips--washing machines and refrigerators made in Turkey.

24. Sark-Mobilya of Ankara--furniture for the kitchen but also all types of wooden furniture.

25. and 26. Tortas of Istanbul and Ankara--steel reinforcing bars. (A wider range of ferrous metal products comes from Metas Metallurji Fabrikasi, Izmir, which was visited by the team on the previous day.)

27. Dyo of Izmir--paints and inks (also visited by the team).

The entire exhibit was modest but represents a real start of Turkish manufacture in modern building construction. The products generally were tasteful in appearance, and looked to be of good quality.

October 23, 1972 Visit to Rabak Copper Mills

The rapidly expanding Rabak Copper Mills buy smelted copper from a state refinery, resmelt it and cast it into plates of 99.6 percent purity, and then electrolytically refine it to 99.95 percent purity or better. They then cast and forge into round bar stock from which they produce rod, wire, strip, and tubing. They also make brass products.

The plant equipment was mostly German. New equipment was being set up by the Turkish workers without supervision by the manufacturer, an evidence of maturing competence.

The laboratory is headed by a capable young chemical engineer, Ms. Ayten Ergul, a graduate of the Technical University of Istanbul, who was in the process of occupying an impressive new small laboratory in which a Baird-Atomic automatic spectrograph was being installed. There was also a vacuum fusion oxygen analyzer, an eddy current conductivity meter for quickly screening rough-cut slices of round bars, a Thomson bridge for conductivity measurement of rod samples, a sonic flaw detector, and hardness and tensile (wire) testers. They have until recently used some test equipment (e.g. tensile) at the Technical University of Istanbul. They also make occasional use of one of the labs of the Ministry of Commerce, and rely on the Mint for silver and gold analyses of refinery sludges. They use NBS and other (LECO for oxygen analyzer) standard reference materials and have on order a number of NBS-SRMs for the new automated spectrometer. Ms. Ergul also asked to receive a new NBS-SRM catalog and information related to copper and its alloys (which have been sent). Practically all products conform to Turkish standards. The company has applied for the TSE mark and its application is currently under consideration. A valuable by-product is the refining sludge which contains gold and silver. From this sludge the noble metals are recovered by a West German Company.

The production is nearly all for domestic consumption, though one exportation to Pakistan was mentioned. There is one other producer of electrolytic copper--a government enterprise near Ankara. Salaries were said to be higher at Rabak; there was no difficulty reported in staffing the laboratory, and turnover is low.

October 23, 1972 Visit to Atli Chain and Needle Factory

The group visited the Atli Chain and Needle Factory in Istanbul. The host was Mr. Ertugrul Soysal, who is also the president of the Chamber of Industry of the Istanbul District. The products are chain, tire chains, needles, pins, paper clips, and thumb tacks. The Company enjoys a competitive position in the world market with considerable exports--17 percent of production--to the U.S. and Australia among others. Problems from the company point of view are: the lack of a TSE Steel Standard to cover the particular low alloy steel used in making chain under the TSE chain standards, and the difficulty in purchasing high quality alloy steel from domestic sources. (They can import satisfactory steel meeting DIN or ASTM standards, but only to the extent that they export.) The result is production of inferior chain for domestic consumption using carbon steel produced in Turkey.

There followed a tour of the plant (including a machine shop equipped with low cost machine tools from USSR, Rumania and Czechoslovakia) which produces machinery for other industries, e.g., a body die and seat cushion molds for Renault, as well as improved copies of the plant's German chain making equipment. The company would like to be able to buy better machine tools from the U.S. and Western Europe. We also viewed machines for the manufacture of chain and needles and facilities for heat treating, case hardening, and electroplating. The quality control laboratory had tensile and hardness testers.

The company has an apprentice program and a total staff of 400. Its management looks forward to Turkish participation in COMMART, believing that they will have better access to materials and that they can compete effectively due to the lower industrial wages in Turkey. Loss of trained workers to Germany is a problem, but some return to Turkey with more experience. The company has contact with universities for consulting purposes. Summer college students are carefully screened before employment to exclude political activists. The management feels that Turkish workers have excellent native skills and intelligence, but that they sorely need training and that Turkish industry generally fails in this area.

As President of the Istanbul Chamber of Industry, Mr. Soysal answered a variety of questions on behalf of the industry of the district. He did not have a strong argument at this time for a district test laboratory.

October 23, 1972 Mensucat Santral Textiles

Mensucat Santral, a large textile plant on the outskirts of Istanbul, is apparently a family controlled business, now in the hands of the second or third generation of owners. During preliminary discussions the Team inquired about laboratory facilities and was told that the company did some evaluation of its raw materials (mainly cotton) but that most of the supplies were bought on reputation and warranty of the vendors. The cotton is all domestically grown. Occasionally, outside laboratories are utilized for physical testing and for compliance with export requirements. The team was unable to visit the company's laboratory because of the demands of the itinerary and received a rather hurried tour of the plant. Both cotton and synthetic fibers (polyester and viscose) as well as blends are processed from fiber to finished cloth. Equipment and techniques seemed fairly modern; there appeared to be more than one hundred looms. A concentrated effort is underway to offer designs which will be attractive to the export market, and the team consensus was that this was showing some success. The firm complies with such Turkish Standards as are applicable but does not use the TSE mark because it feels that currently there would be no

benefits--the company's reputation is sufficient to assure its customers. The manager indicated that TSE could enhance its services by increasing the number of standards that could be used for export arrangements.

The team made a hurried visit to the company's outlet shop where they viewed a comprehensive display of its products.

October 23, 1972 Visit to Kalekalip and Elektroporselen Plant

At the Kalekalip and Elektroporselen Plant in Istanbul the Team was received by the plant manager. As time was quite short, the visit was limited to a brief overview and a tour of the manufacturing facilities. The company specializes in punch and die making and in injection molding equipment for glass, ceramics, and plastics. It also makes switch leaves, magnetic cores, sockets, and bases. It has 40 well-trained machinists, many with experience in Germany, and an apprentice program coupled with schooling in mathematics and engineering drawing. They draw upon the faculty of the Technical University of Istanbul for consultation on materials. The plant manager has himself observed German practices and admires German methods of apprentice training, which he is copying. Typically these might provide up to two days of study per week over a period of several years. The Istanbul Chamber of Industry helps by providing certain basic courses, e.g., mathematics and drafting. The machine tools were modern and of good quality; they included all of the usual machine tools plus a modern automated spark erosion machine. Of all the plants we visited, this one evidently had the highest capability for precision manufacturing. It exports part of its output of ceramic insulators to Germany.

The manager expressed concern over "fast buck" operators in Turkey, e.g., street sellers of excellent looking pliers, made, unfortunately, of zinc alloy. He endorses TSE goals and feels that more standards are needed. The ceramic insulators made by this company bear the TSE mark.

October 24, 1972 Adana and AID, Ankara

While the rest of the NBS/AID team visited Adana, Peiser stayed in Ankara to discuss the mission with Mr. John Fry of AID, Washington, who was making a one-day visit to Turkey. Miss Belcher of U.S. AID and Peiser discussed with Fry the status, opportunities and the challenge of the Turkish survey. All agreed on the timeliness of the survey and the excellent preparations made for it by TSE.

In the afternoon Mr. Fry and Peiser were received by Dr. Somer, the Survey Director. The distinction between government-operated and private-sector industry was discussed. Private industrial firms are

more inclined to seek consultants of high academic stature. Yet it is easier for University experts to accept outside payment for consulting services from Government organizations, as this has less appearance of conflict with their duties to the students, for which they are already paid by the Government. It is thus felt that the Government and only the Government should ask them to undertake other work.

The group in Adana was very hospitably received by the staff of the Chamber of Industry. Despite the lateness of the hour, the Team was met on arrival at the airport on the 23rd by the Secretary-General and driven to its hotel. Although time was too short for a comprehensive survey of the city, the parts of Adana viewed by the Team showed signs of recent rapid growth to its position as fourth largest city in Turkey. This impression was reinforced by comments of the Secretary-General and others as well as by a view of the city from the Cotton Exchange. It was indicated that only a decade or two ago Adana was little more than an agricultural center.

The Team was driven to the Chamber of Industry and was immediately received by Mr. Sakip Sabanci, its President, and by the Secretary-General. Mr. Sabanci impressed the Team as an industrialist of imagination and social responsibility. He is a strong supporter of TSE, though his textile firm, like the others, does not utilize the TSE mark. He feels that the Turkish public and many manufacturers are insufficiently aware of the useful role of product standards and that TSE ought to launch a well-planned and professional informational campaign. He thinks more standards are required, especially those affecting exports and that TSE should be given resources needed for their production. When asked for his opinion of the need for expanded laboratory services, he unhesitatingly answered that he believed the question required a serious and objective study before decisions could be reached. Mr. Sabanci not only controls a significant segment of the Adana textile industry but also figures strongly in the Akbank and is expanding into synthetic fibers.

The Bossa Textile Plant, the next stop on the Team's itinerary, is a very large and fairly modern establishment which runs the whole gamut of processing from fiber to finished cloth. It employs 5,000 workers in three shifts and houses some of them in on-site family housing. The machinery is eclectic (German, British, Swiss, Italian). At present less than five percent of the output is exported, e.g., to Arab countries. A large part of the output is cotton but polyester is also utilized. There is a certain inflexibility in their costs due to the necessity to buy their cotton from the state enterprise, Sumerbank. The textile laboratory had a fair variety of equipment but no atmospheric control. However, they plan to install this in the near future.

After a lunch provided by the Chamber, the Team was driven across an irrigated plain producing citrus and cotton to Mersin about 70 kilometers to the southwest. Mersin is a port city on the Mediterranean, said to be largely a fruit packing and processing center, although there was ample evidence of heavy industry and refining as well. Following a brief interview with the local Chamber of Commerce and Industry, the Team visited a fruit packing plant in Mersin. Tangerines and grapefruit were being sorted and boxed using a sizable staff of women workers, though the plant was obviously operating much below capacity. Conveyors and hoppers did most of the sorting and sizing, carrying the fruit past inspectors. Subsequently, the Team met with the Plant Manager who concentrated on the export problems of the fruit packers. These problems are almost all related to packaging materials and structures. The discussion and presentation was a strong argument for the packaging laboratory proposed for TSE by the OECD consultants. This advice appeared to this Survey Team to be as valid now as when it was given (compare Section VII). Quality controls (size, sugar content, acidity) are apparently well in hand due to the availability of Turkish Standards and critical scrutiny by foreign buyers. The latter has led to some past rejections, with salutory effect on the Turkish packers. It was remarked that competing packing plants were being established although the present one was obviously underutilized. The team was unable to ascertain why.

October 25, 1972 Final Session with Survey Director

In a brief final session, Dr. Somer pointed out some additional problems due to TSE not being involved sufficiently or at an early enough time in the development of new industrial product lines, both in private and state industries. He also expressed his own opinion in favor of creating regional TSE facilities in the following order of preference: Istanbul, Izmir, Adana.

October 25, 1972 Visit to TBTAK

TBTAK is the acronym of the Scientific and Technical Research Council of Turkey. It was founded in 1963 and, in effect, began to operate in 1965. Our visit with representatives of TBTAK was impromptu and was arranged at our request after we had heard it referred to in earlier discussions. The visit proved to be very significant due to the importance that TBTAK apparently will have in Turkish applied research and technological development. Our discussion was held with Dr. S. C. Ozoglu, A. S. Torel, Refet Erim, and Akdogan Mat.

TBTAK is a government organization with functions that resemble those of the U.S. National Research Council and National Science Foundation. They include the support of education, the support of

research, and policy advice to the government. Research is supported by two mechanisms: (1) the funding of proposals received from outside of TBTAK and (2) the operation of in-house facilities. A current budget summary was not available. Further details on the above two mechanisms follow:

1. Apparently proposals from any source may be considered, including industry and other government agencies, but, in fact, most are from the universities--especially the Middle East Technical University (Ankara) and the Technical University of Istanbul. The management of these projects is handled by "Research Groups" in TBTAK with the following titles: Mathematical, Physical, and Biological Sciences; Engineering; Medical; Veterinary and Animal Husbandry; Agriculture and Forestry. The supported projects have a narrowly applied flavor, as indeed would seem to be entirely appropriate for Turkey in its present stage of economic development. They include, for example, researches in pollution abatement, reclaiming of copper slags, smokeless fuels, abatement of mine explosions, and voltage regulation. In some cases, researches are supported jointly by TBTAK and other bodies on problems of mutual interest, e.g. with the Mineral Research Institution.

2. The principal in-house laboratory is now under construction at Gebze, near Istanbul. It is called the Marmara Scientific and Industrial Research Institute. There are also a Building Research Institute and an Institute of Life Sciences. The conduct of "in-house" research is organized under "Research Units" with the following titles: Applied Mathematics, Materials, Electronics, Food Technology and Nutrition, Mechanical, Plant Taxonomy, Arid Zone, Polymer Chemistry, Mathematical Research, Solid-State Physics, Operational Research, and Science Policy. Some of these units are located at universities or other outlying sites but are fully supported by TBTAK, which encourages staff interchange and communication with the host institutions. Finally, there is a Documentation Centre. The planned functions of TBTAK do not include those of a national metrological laboratory, and it appeared that this possibility had not been considered during the planning of TBTAK.

The budget of TBTAK this year is 80 million Turkish lira, but this includes some of the construction costs of the Marmara Institute. A normal operating level might be 60 million TL (about four million U.S. dollars). The total staff will be about 1,000. The research staff at the Marmara Institute will number about 250.

Clearly, TBTAK has the potential to be the major element in the national technological scene. Also, the fact that it apparently has the only technology assessment and policy research activity in Turkey is a significant factor in assessing its importance. This impinged on one of

the recurring questions encountered by the present study team, namely, whether regional testing laboratory facilities are needed in Turkey. The TSE felt that such facilities were indeed needed but did not offer convincing evidence to support this view and obviously had not researched the question. In contrast, we were told by the President of the Adana Chamber of Industry that TBTAK had sent a small team to examine this question as it related to textiles only and had prepared an as yet unpublished report. It seems probable that in-depth studies by official bodies such as this are likely to be influential policy determiners, and that the technique might well be adopted by TSE in analyzing such issues as the one of regional facilities.

October 29, 1972 Team Discussions

Mealtime, evenings and weekends provided many opportunities for team members to discuss among themselves impressions, views, and conclusions. Possible recommendations were debated and, as time went on, a consensus on the nature of the problems emerged. The team discussed such questions as: How much could be expected of the relatively small, largely independent TSE? Should it risk its present effectiveness by taking upon itself largely nonreimbursable functions which are critically needed for Turkish industrialization goals?

Such discussions were important in the somewhat more formal meetings with the Survey Director, especially the concluding session in which the entire senior staff of TSE and Professor Can participated. (Some foreign team members had already departed before that meeting.)

Peiser summarized the contents of the draft report which was in the early manuscript stage. There was praise for the written standards and for the TSE quality marking scheme which appeared to be effective in part through the associated guarantees. The TSE laboratories and associated buildings invite wider usage and increased staffing. Yet, the proposed establishment of a calibration service at TSE should be examined carefully. A cautious approach through the provision for one specialty at a time is preferable to a commitment to the possibly premature establishing of a comprehensive calibration service. SRMs might be such a specialty through which TSE might gradually enter the calibration field. AID funding had made it possible for TSE to become the focal point in Turkey for the dissemination of and consultation on the use of SRMs.

Similarly the establishment of test laboratories and particularly district laboratories in major geographic centers of industry operated from TSE in Ankara as a central administrative and technical headquarters might drain staff equipment and financial resources from Ankara, where they would be most needed, or lead to substandard

provincial test facilities. The team felt such a scheme should be undertaken only after a detailed benefit-cost analysis. Necessarily this question of provincial laboratories would remain an open one. However, Professor Somer requested the team to emphasize this problem and its associated considerations in its report. The Turkish chambers of industry supported TSE strongly. Might they not expect TSE to supply rapid test services in their own localities?

Similarly the question of a printing shop came up for discussion. The Team would not question that fault-free high quality printing was an essential need for TSE, but the team members did not accept readily the conclusions that--in consequence--the printing had to be done on their own premises. Yet this view by TSE might well have been justified under the given circumstances in Turkey. In any event, the decision had been made and the relevant financing request had been submitted to the Ministry of Industry and Technology.

During the final session, training assignments to NBS and temporary assignments of NBS staff or retirees to TSE were discussed.

Professor Somer requested the Team to write a forthright report in which frank criticism would be made where needed without fear or personal considerations, feeling that in the long run this was the kind of report that could help TSE the most.

Mr. Peiser emphasized that the Team had learned from Turkish systems and experience. The knowledge would better fit the team members to help and advise other national technical services. The Survey had been held and concluded in a friendly cooperative spirit with its members prepared to face the considerable challenges involved.

Appendix 2

REMARKS PREPARED FOR DELIVERY BY W. E. ANDRUS, JR.,
PROGRAM MANAGER, ENGINEERING AND INFORMATION PROCESSING STANDARDS
NATIONAL BUREAU OF STANDARDS
AT THE CELEBRATION OF WORLD STANDARDS DAY
AT THE TURKISH STANDARDS INSTITUTION
OCTOBER 14, 1972, ANKARA, TURKEY

THE ROLE OF STANDARDS IN INTERNATIONAL TRADE

Thank you, Mr. Isfendiyar.

Professor Somers, ladies and gentlemen, it is indeed an honor to join with you today in celebrating the 14th of October - - World Standards Day. Although this is my first visit to the Turkish Standards Institute (TSE), I feel very much at home because of my long acquaintance with TSE and its outstanding staff. I first became acquainted with TSE in 1961 when I met Faruk Sunter at the ISO General Assembly in Helsinki and Olle Sturen, now Secretary General of ISO, both of whom played such an important role in establishing your fine institution. I have become well acquainted with Dr. Sunter over the years and through his leadership during his term as President of ISO (1968-1970), ISO is prepared to accept and be responsive to the vast standards challenges of the 1970's.

I have also become well acquainted with your outstanding Secretary General, Velid Isfendiyar, and most recently I met your new President, Dr. Somers, last month at the ISO Council meetings in Geneva.

Because of my association with these fine gentlemen, it is not only a pleasure to join you on World Standards Day, but also indeed an honor to be a member of the U. S./AID International Survey Team who will be studying the Turkish standardization and certification programs during the next two weeks. My only regret is that I will be unable to spend the entire two weeks in Turkey since I must leave for London this Sunday to attend the Fourth International Conference of the International Organization of Legal Metrology. On September 22, 1972, the United States acceded to the Convention of the OIML, and the Fourth International Conference convenes on Monday, October 23.

My topic for today is the role of standards in international trade. I intend to briefly discuss what standards are, why they are important, and how both international standards and product certification systems affect international commerce. I would then like to tell you about the effort in GATT (The General Agreement on Tariffs and Trade) to develop an international policy guide for standards and certification programs.

A brief summary of the economic benefits of standards would include the following: They, first establish recognized levels of quality, performance, and safety; secondly, they help reduce misunderstandings between producers and users; thirdly, they provide a rational basis for contracts; fourth, they simplify procurement and repair by providing interchangable parts and sizes; and finally they increase opportunities for trade.

In the United States we have a relatively free movement of goods among all of our fifty states. This is made possible, or is certainly enhanced, by the some 20,000 national standards which have been written and promulgated by the private voluntary standards system in our country. Only with uniform standards such as these could any country aggregate a market such as we have in the United States.

It follows that to have the maximum free interchange of goods between nations we need harmonized standards--internationally recognized. In the past national standards of the larger industrialized nations were largely acceptable to, and used by, trading partners because of the clearly superior and advanced technology. It was not as necessary then, as it is now, to participate actively in the international standards writing exercise to ensure that local technological needs were reflected in the international standard. But times are changing; we can no longer assume that national standards of the larger industrialized nations will automatically be the preferred standards.

One of the changing situations we face is the growing influence on standardization of regional groups such as the Common Market and the European Free Trade Association which make up Western Europe.

The Western Europeans, in the early sixties, found themselves with thirteen different standards in many cases. There were two organizations formed, CEN and CENEL, to negotiate the differences in these standards. They had, as you may expect, limited success in negotiating common standards and they early recognized that the problem could only be solved if nations adopt the same standard at the outset, rather than waiting until they had their capital equipment in place and committed to a particular type of production. In recognition of this fact, it is expected that the standards adopted in the future by Western European countries will be predominantly the standards written by international organizations such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). It is not necessary for me to describe ISO and IEC to this audience. Suffice it to say that they are both private, non-treaty organizations which have been in business since around the turn of the century. There is essentially worldwide membership in both organizations with approximately fifty-some odd nations belonging. The Turkish representative is,

of course, TSE, your Turkish Standards Institute. As the ISO and IEC standards assume new importance the Western European Countries will increase their participation level in ISO and IEC so as to assure their voices are heard early in the standards development process.

What does all this mean to Turkey, and the other nations of the world? If Western Europe succeeds in making an economic union of that part of the world, they will have an economy of the approximate size of the United States. For an economy of this size, they will need many additional industrial standards, a number near that which presently exists in the United States. If, as is their stated purpose, they adopt international standards to meet the needs of this economic union, then there will be needed approximately twenty thousand ISO and IEC standards. Presently only about two thousand such standards exist. But if you look at the rate of production of the standards of these two organizations, you will find that over half of the total standards that exist today were written in the last three years. And if you project this trend forward, you will find that the balance of the standards needed, approximately eighteen thousand of them, may well be written during the decade of the 1970's. If a country's needs and practices are to be reflected in these standards, it is imperative that each country participates effectively in the writing of such standards, starting now! As I previously mentioned, this has been recognized by the Western Europeans and they are drastically increasing their rate of participation. In fact, in France and Germany, the staffs and budgets of their national standards institutes have recently doubled. Moreover, the Europeans are pressing the International standards organizations to move more quickly in producing new standards.

The United States has recognized this growing trend and has taken a number of actions to increase the level and effectiveness of its participation. Let me scope the size of our concern by pointing out that about $14 billion of U. S. exports are identified as being standards sensitive.

Let us now take a look at international product certification and what it means to trade.

Even after you have agreed-upon standards, there can be a barrier to international trade caused by the need to retest a product in an importing country in order to measure compliance with a standard. In order to eliminate this expensive need to retest products, many are turning to product certification as an answer. The particular solution that seems to be popular in Western Europe can be described as total harmonization. Total harmonization is a three-step process: (1) agree upon common standards, (2) agree upon a quality assurance program acceptable to all participating countries, and (3) certify products

that meet the standard and that follow the agreed-upon quality assurance program by applying a "Mark of Conformity."

A first product area selected for this process was electronic components under the CENEL program. However, we have reason to believe that many other products will be included in the same type of process in the near future. CENEL is currently attempting electronic components certification and CEN is far down the road towards finalizing a certification plan which might well apply to many other products.

One of the disturbing aspects of the emerging European product certification schemes is their exclusive nature. By that I mean that participation in the certification scheme, in many instances, is only open to Western European countries. If the buyers of these products within those European countries give limited or exclusive buying preference to products bearing the mark of conformity, then these become serious nontariff trade barriers. Also, many of these systems require that each country have a single organization representing all interests of that country in the certification system. By all interests they mean government, industry, and effective user or buyer acceptance. For the United States to participate in such a certification system requires a new relationship between the Federal Government and private industry on matters of standardization, laboratory accreditation, product testing, and product certification. In Turkey you already have the beginnings of an acceptable and effective certification program.

Let me now turn your attention to the work effort that is under way in GATT (General Agreement on Tariffs and Trade) to deal with the subject of standards and certification as barriers to trade. The GATT is an organization with approximately eighty signatory countries as members. This organization is headquartered in Geneva and is a major trade negotiating body.

The elimination or reduction of non-tariff trade barriers, or so-called NTB's, was an important objective of the work program of GATT that was initiated at the end of the Kennedy Round Tariff Negotiations in 1967. On the basis of countries' notifications, an inventory of more than 800 alleged non-tariff barriers was compiled and later examined by the GATT Committee on Trade and Industrial Products.

The next stage of work was a search for possible solutions to the major barriers. For this purpose there were five working groups established to consider the NTB categories into which the notifications had been grouped. One of these categories concerns technical barriers to trade in the area of product standards and certification. In meetings during the spring and fall of 1970, various solutions to these problems were proposed and discussed.

In February 1971, it was agreed among the GATT participants to give priority attention to product standards. Standards were chosen for priority attention, not only because of their growing importance, but also because it appeared that progress might be more possible here than in certain other areas. All countries have an interest in this question and, in large part, work on standards deals with potential trade barriers rather than with difficult rollbacks of existing restrictions.

In considering the NTB complaints in the standards field, a number of countries, including the United States, indicated an interest in considering an international code of conduct designed to promote the use of standards and certification in facilitating trade and to prevent the use of standards from becoming technical trade barriers. This is a forward looking effort to deal with this subject in such a manner as to prevent barriers to trade, rather than the traditional way of dealing with problems after the fact.

It is recognized by those countries which are participating in this GATT exercise that international harmonization and certification of product standards can actually facilitate trade. Significant economies can be realized if exports are designed and tested for a large multicountry market rather than for a number of separate national markets with different standards and quality assurance requirements. However, it was also recognized that if international standards harmonization and certification arrangements are exclusive they can result in technical barriers to trade.

Much of the thrust of the efforts in the GATT on this standards code are directed toward assuring that standards will be used to faciliate rather than to impede trade. In particular, emphasis is being given to worldwide rather than to regional or other exclusive standards arrangements.

There have been approximately ten meetings, involving about thirty countries, or GATT Working Group III in attempting to develop such a standards code. They have gone through several drafts of such a code and the present draft is approximately 37 pages long. This code is intended to apply to both mandatory standards, written by government, and to voluntary standards, written by private organizations. Furthermore, it would apply to standards bodies at the central, state, and local government levels and to voluntary or private standards bodies.

The proposed standards code covers the entire field of industrial products including agricultural products. And it deals not only with the subject of standards, but product certification as well. It is truly intended to be an international policy document for nations to follow in the drafting and enforcement of standards and product certification systems. I hasten to add that GATT will not, however, write standards.

In its present form the GATT standards code would: (1) encourage participation in standards writing in international organizations so as to harmonize standards on as wide a basis as possible, (2) it would encourage participation in international certification arrangements assuring conformity to standards, (3) it would formulate rules for regional standards arrangements so that, in standards writing and certification, these arrangements will not operate to restrict the trade of third countries, and (4) it would formulate rules that should be followed by nations so that standards writing and certification will not afford unnecessary protection to domestic production.

The GATT Working Group III concluded its most recent meeting last week in Geneva and apparently has made considerable progress in resolving some of the problems associated with the proposed code. The Working Group now fully expects to complete its work at the next meeting scheduled for this November. Implementation of the code requires approval of the parent committee and, of course, ultimate ratification by the signatory countries.

I might summarize by saying that in my opinion international standards and their effect on international trade is more of an impact of the future rather than an historical lesson of the past--although we can learn a lot from the problems of the past. We have, of course, all learned to live with differing national standards and to adjust our products to meet those standards. The Japanese radio manufacturer knows that in order to sell radios in Eastern Turkey these radios must be able to operate on 220 volts and 50 hertz -- and have plugs with round prongs. By the same token, to sell the same radios in the United States they must operate on 110 volts and 60 hertz and have plugs with rectangular prongs.

International standards will probably never affect national de facto standards of this nature; but they will affect and make more uniform other standards for products and services.

The increasing use of the metric system, the SI units, will eliminate many measurement problems associated with international trade--problems of size and quantities. It is fully expected that the United States, the one last remaining industrialized nation using the "inch system," and not committed to a change, will in time make the change to SI units.

Olle Sturen, Secretary General of ISO, said in a recent speech at the National Bureau of Standards,

> "One real difficulty in international standardization, which has nothing to do with the use of measurement systems, is what I like to call differences in 'health and safety philosophy.' You would think that what is considered safe in Belgium would

> be good for Holland and vice versa. But, in a number of instances, this is just not true. This being so between small neighboring countries, it is not difficult to imagine the problems faced in trying to reach agreement on a global scale. Needed here primarily is a better collaboration between government agencies establishing minimum requirements for safety and standards organizations, and a better understanding by governments of the need to change present national safety philosophies and adopt an international approach instead."

I must agree with his comments since differences in "health and safety philosophy" could become one of the most serious roadblocks in international standardization.

It is my firm belief that in the long term international standards will be a key factor to successful international trade. National standards based upon international standards will reduce significantly unnecessary product requirements and variations. The result will be lower cost products and services to the ultimate benefit of the consumer. International standards will enhance the free and competitive international marketplace and will ease the entry into that marketplace by developing nations.

We must remember, however, to emphasize the international aspect. We can ill afford to allow regional standardization and product certification programs to come into being which have geographical or geopolitical restrictions. Such programs must be open to participation by all countries of the world in order to maintain a truly international competitive market.

Thank you.

Appendix 3

THE IMPORTANCE OF MEASUREMENT SCIENCE AND TECHNOLOGY TO STANDARDIZATION AND THEIR CONTRIBUTION TO INDUSTRIAL DEVELOPMENT

(Text of H. S. Peiser's proposed speech at the "World Standards Day" to be celebrated in Ankara, Turkey October 14, 1972)

It is commonly believed that a quality product has a look or feel or taste by which it can be instantly recognized as a product of excellence. In fact, it may be generally true that a high quality product looks the part, but not all good looking objects are quality products. The hidden parts, the uniformity of performance, the life expectancy, the repair capability, the effects of the environment, the influence on the environment and the safety in use cannot be assessed at sight. Most, if not all these elements must be gaged by measurement. Such quantification is generally not simple. The need exists in the modern world for a sophisticated technical backup. Whenever we discuss industrialization we must not fail to stress the difficulties of this all-important quantification involved in quality measurements. Every nation must hope to create and perpetuate for its products an image of recognized quality and established reliability. In discussions with friends abroad, staff members of the U.S. National Bureau of Standards have emphasized the hard fact that to reach important industrialization goals a nation must aim to provide services useful for controlling production, certifying quality for trade, and establishing records of reliability. It is a hard lesson that Germany, Britain and Japan have learned well, in addition to the U.S. There is a need for a national capability in measurement and standardization.

The U.S. Agency for International Development has asked NBS to find out in what ways the services which NBS offers to U.S. industry, other U.S. government agencies, and the general public are relevant to foreign countries which AID has been trying to help in reaching national industrialization goals for their economic growth. Further, in what ways could NBS give assistance to such less developed countries by consultation or other means so that sister organizations in those countries could obtain needed support? To explore all these and related questions a seminar was held in February of last year at Airlie House, Virginia. We invited and were privileged to welcome participation by representatives from 13 nations as well as several national and international organizations. I wish here to summarize the proceedings of that seminar, which are now published, and discuss with you our program that is developing as a result of that seminar.*

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*See Proceedings of a Seminar "Metrology and Standardization in Less Developed Countries: The Role of a National Capability for Industrializing Economies," edited by H. L. Mason and H. S. Peiser, National Bureau of Standards, Special Publication 359 (1971).

Dr. Lewis M. Branscomb, then the Director of NBS, explained how we at NBS are seeking a better understanding of the industrial and governmental significance of the services NBS provides. However, we should not hide the fact that we do not have a satisfactorily clear picture of the roles of these services even within the U.S.A. We certainly do not have a good judgment on the extent to which services optimized for the United States would be immediately relevant to less developed countries. Most important is our realization that, essential though standardization and measurement technology are, there are other equally essential ingredients needed for economic growth through industrialization.

So that we would not lose sight of these other ingredients in our symposium Mr. George Kalmanoff of the World Bank gave a quick overview of economic aspects and Admiral Geraldo N.S. Maia of Brazil a glimpse of the political, sociological and cultural implications of industrialization. Such matters were recognized as of great significance though not the prime target of our seminar. They are also not the theme of today's discussion in Turkey.

Mr. Joel Bernstein, Assistant Administrator of AID, set the stage for the seminar objectives. He called for conclusions and recommendations on the following question: should AID and NBS move forward together in support of infrastructure scientific and technological services in less developed countries for their economic growth? After NBS had described in summary its supporting activities within the U.S.A. the answers from the seminar participants, as well documented in the published proceedings, was an enthusiastic "yes." However, we have to emphasize that we are a small organization in relation to the responsibilities given to us by the Congress of the U.S.A. When we work in support of other agencies such as AID, we must ask that our services be used only if they are unique and can show a high benefit to effort ratio. Part of our reason for being here in Turkey is to ask what you feel about these objectives and the realistic limitations. For Turkey such collaboration would not be new because close ties have long existed between the Turkish Standards Institute (TSE) and NBS. I want to acknowledge especially the work of Dr. W. Brombacher who is well past his 80th birthday, and who helped to plan the outstanding laboratory facilities here at TSE.

NBS may differ in some respects from other national institutions in standardization and measurement. It has no regulatory responsibilities and seeks none. We recognize that many countries assign both metrology and quality control regulation to the same organization. Although we see limitations in such systems the NBS recognizes that it is the choice of each country to decide on its system. No country should blindly copy another's system of standardization, particularly not that of the U.S.A. where unique circumstances have determined the pattern followed. Differences in systems do not preclude international cooperation, fortunately.

Descriptions of NBS services were dispersed throughout the seminar. None aroused more interest than Mr. J. Paul Cali's presentation of the NBS standard reference materials program. Dr. H. T. Yolken, the deputy to Mr. Cali, is with us here in Turkey to help in planning effective use of these SRM's to Turkey's industrial needs. Dr. Robert D. Huntoon, former Director of the NBS Institute for Basic Standards, pointed out that such SRM's provide users a powerful method for self-evaluation of measurement capabilities. The presentation of Dr. W. E. Cushen, Chief of the NBS Technical Analysis Division, on operations research left our friends from the less developed countries wondering how these techniques might be applied to their local problems. Dr. Cushen is hoping that he or one of his colleagues might have the opportunity some day to demonstrate the power of his methods on a real system in Turkey. The U.S. Government science and technology information services were summarized by Melvin S. Day, then of the National Aeronautics and Space Administration, but now Deputy Director of the National Library of Medicine. His was a signpost kind of summary of the technical information resources in the U.S. Government. This summary should be of great value outside the U.S.A. Few realize how much information you can obtain just for the asking.

Most enlightening to us at NBS were the lectures and contributions from outside our own organization. Dr. Jesse D. Perkinson, Director of the Department of Scientific Affairs of the Organization of American States, in his keynote address on the role of a national capability in metrology and standardization in industrializing economies, quoted an unforgettable portion of Henry Grady's description of Georgia, a once disadvantaged, underdeveloped state of the Union:

"A few years ago I told, in a speech, of a burial in Pickens County, Georgia. The grave was dug through solid marble, but the marble headstone came from Vermont. It was in a pine wilderness, but the pine coffin came from Cincinnati. The iron mountain overshadowed it, but the coffin nails and screws and the shovels came from Pittsburgh. With hard woods and metals abounding, the corpse was hauled on a wagon from South Bend, Indiana. A hickory grove grew near by, but the pick and shovel handles came from New York. The cotton shirt on the dead man came from Cincinnati, the coat and breeches from Chicago, the shoes from Boston; the folded hands were encased in white gloves from New York, and round the poor neck, that has worn all its living days the bondage of lost opportunity, was twisted a cheap cravat from Philadelphia. That country, so rich in underdeveloped resources, furnished nothing for the funeral except the corpse and the hole in the ground, and would probably have imported both of those if it could have

done so. And as the poor fellow was lowered to his rest, on coffin bands from Lowell, he carried nothing into the new world as a reminder of his home in this, save the halted blood in his veins, the chilled marrow in his bones, and the echo of the dull clods that fell on his coffin lid.

"There are now more than $3,000,000 invested in marble quarries and machinery around that grave. Its pitiful loneliness is broken with the rumble of ponderous machines, and a strange tumult pervades the wilderness. Twenty miles away, the largest marble-cutting works in the world puts to shame in a thousand shapes its modest headstone. Forty miles away, four coffin factories with their exquisite work tempt the world to die. The iron hills are gashed and swarm with workmen. Forty cotton mills in a near radius weave infinite cloth that neighboring shops make into countless shirts. There are shoe factories, nail factories, shovel and pick factories, and carriage factories, to supply the other wants. And that country can now get up as nice a funeral, native and home-made, as you would wish to have."

The program also featured case studies of a number of less developed countries: Argentina, Colombia, Ethiopia, Ghana, India, Iran, and Vietnam.

Labor-intensive versus capital-intensive industrial technology, a controversial subject, was discussed by Dr. Joseph E. Stepanek, Director of the Industrial Services and Institutions Division of the United Nations Industrial Development Organization in Vienna. A country with an inexpensive easily trained labor force will tend to prefer a capital-intensive manufacture, but there is a danger that finding jobs for unemployed hands will be regarded as an end in itself overshadowing the real needs for production. Managers should always be warned to avoid a labor force in excess of that needed for the job at hand. In other words one should not allow policies for reduction of unemployment rule industrialization policies. An Indian railroad executive recently said to me "We now realize there is nothing as expensive as cheap labor." I well realize this is not a problem in Turkey; instead you have the challenge of a fine labor force, partly trained in highly industrialized countries, who need to be put to work in modern factories.

Another controversial topic was market research. If the techniques set out by Mr. Seymour Marshak of the Ford Motor Company were absolutely essential to an industrial enterprise we would have to leave all production efforts to large or at least very wealthy organizations, else the funds surely would run out in attuning the product to the market. However, we must not dismiss market

research lightly for projects of stable organizations. Large companies and governments cannot afford to make many wrong decisions any more than small ones. The technological successes of the U.S.A. may in part be based on the fact that small companies have much of the action. When they make wrong decisions they can go out of business without causing more than a ripple on the total industrialization effort.

Mr. Jerry L. Hayes, Technical Director of the U.S. Navy Metrological Engineering Center, made a strong case for a national metrological capability, he concluded that in the absence of adequate capability, industrial chaos would result, whereas metrology could help towards better and cheaper products provided the measurement system itself was carefully controlled. Mr. Simon E. Russek of the Hughes Aircraft Company presented a similar viewpoint but related it to the systems analytic approach. In an appended statement Mr. F. J. Lehaney, Chief of the Applied Physics Division of the National Standards Laboratory of Australia, described the metrological facilities in that country. Dr. M. C. Probine, Director of the Physics and Engineering Laboratory of New Zealand, working for UNESCO, had developed a questionnaire for less developed countries to survey their metrological capabilities. The questions asked are themselves reproduced in another appendix of the printed proceedings. I believe it would be a useful exercise to complete the questionnaire in respect to other countries such as the U.S. and Turkey?

Dr. H. Tabor, Director of the National Physical Laboratory of Israel, in a most incisive review questioned the cost effectiveness of metrological services at the highest achievable accuracy in smaller or less developed countries. Such services are rarely used, easily available internationally, and expensive to achieve. If in a measurement you can afford to double your uncertainty you often cut your cost by at least a factor of ten. One seminar participant concluded that, by agreeing with Dr. Tabor, we had in fact voted against measurement services in less developed countries. How wrong he was! The seminar voted for measurement; yet with accuracies, precisions, or compatibilities no greater than is really needed for valid economic goals. Valuable resources can be wasted on services that are not needed. Dr. Tabor's analysis, though not directed primarily at NBS, was a most helpful lesson to us. Questions such as these will engage Dr. R. J. Corruccini of our team during his stay in Turkey.

Instrumental problems were discussed by Professor Luiz Cintra do Prado of Brazil who is presently the only member of the International Committee for Weights and Measures from Latin America. This Committee of experts deals with the problems of international harmonization of basic metrological standards. In our seminar, Dr. do Prado pointed out the principal pitfalls of procurement, maintenance and calibration of instruments and how less developed countries could be helped by international cooperation.

Dr. Glenn E. Pratt of the Monsanto Company presented the viewpoint of industrial firms of developed countries which are seeking the right "soil" for growth and development of their organizations in smaller and less developed countries. Some of the pained reactions to his remarks were no doubt directed at the facts of technological life rather than at the author. One senses that most multinational organizations with home offices in the U.S.A. are not trying to transplant America to any other nation. Most of them are consciously trying to respect the cultures of the countries in which they operate. As Dr. Jorge A. Sabato, Presidente, Servicios Electricos del Gran Buenos Aires, pointed out in discussion, Dr. Pratt's paper truthfully stated that technology is a commodity of commerce. It is not something which at the behest of a benevolent government can be transferred to another nation. In contrast I would like to stress that much of the scientific capability and the infrastructure for technology such as is represented by NBS is transferrable, at a relatively very small cost, by decision of cooperating governments.

Special emphasis should be placed on the seminar discussions on standardization itself. Dr. Frank L. LaQue, President of the International Organization for Standardization, described the spread of standardization from factory to the international level. Dr. A. N. Ghose, former Director of the Indian Standards Institution, described the national role of standardization, discussing the subject in terms of a three-dimensional matrix, consisting of: 1) "aspect," that is the type of standardization: nomenclature, specification, sampling and inspection, tests and analyses, limitation of variety, grading, code of practice, and packaging, conservation and transport; 2) "level" from company to association to national to international; and 3) "subject" that is engineering, transport, housing and building, food, agriculture, forestry, textiles, chemicals, industry, commerce, science, and education. The President of the American Society for Testing and Materials, Dr. R. B. Smith, pointed out the value of engineering standards in assisting industrialization.

In a prologue session the operations of the American organization called Volunteers for International Technical Assistance, (VITA) was described. Mr. Edward S. Dennison, Executive Secretary of that organization showed us how much easier it is to achieve progress in small individual projects and problem-solving activities than to influence the general infrastructure and atmosphere for industrialization and innovation. No one who listened to Mr. Dennison could forget some of the successes he described. He also mentioned a few failures such as the perfect sun-cooker that failed because Moroccans liked to cook after sunset.

In this discussion I have mentioned some of the follow-up activities which we have cautiously started; and now I would like to describe briefly the program we have begun in partnership with U.S. AID. We have made standards literature from the U.S.A. available to many countries. The generosity of several standards organizations in the U.S.A. has greatly helped by making such literature available at reduced costs, but our financial resources are still inadequate for the immense demand and need. Similarly we have offered our standard reference materials to less developed countries on the basis of a justified individual need. Again, the demand has outstripped our ability to respond. In addition, we have made a modest start in joining with other experts from less developed countries in a mutual consultative effort to survey existing standardization and measurement facilities in certain target countries. Turkey has agreed to be one. The aim is to identify the most effective infrastructure services in terms of the visible needs of industry and government in full conformity with national goals and cultural background. We have asked representatives of the target countries to understand that we at NBS do not know the answers to most of their problems, but by drawing upon the experience of the NBS in the U.S. and particularly that of other target countries, we may jointly arrive at insights which will be of significant help to the nation that has requested such cooperation. In this experimental program representatives of each of the participating countries have been members of the team that has surveyed each country. Mr. Fuat Yucesoy of the Turkish Standards Institution has represented Turkey with distinction and has thereby contributed to the team's analysis of the problems of Ecuador and Korea. Representatives from Ecuador, Korea and Thailand are with us in Turkey. They join the NBS team during the next two weeks to be of service in discussing Turkey's industrialization goals and the relevant technical services.

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16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

The survey of standardization and measurement services for developing industries in Turkey has been carried out by NBS with funding by AID, with participation by representatives of Ecuador and Korea, and under the guidance of the Turkish Standards Institute. The Survey Team spent two weeks in Turkey where it inspected representative laboratories and plants, and had discussions with leaders of Government, the USAID Mission, principal universities and industry. The Report describes the preparation for the Survey, a summary of the economy of the country soon to be a full member of the European Common Market, notes on Turkish science and technology and the independent Turkish Standards Institute recognized by law as the national standards body. Issues addressed are 1) Standards Development, 2) Test Methodology, 3) Product Certification, 4) Product Testing, 5) Calibration, 6) Weights and Measures Control, 7) Export Control, 8) Quality Control, 9) Consumer Protection, 10) Industrial Extension, 11) Building Codes, 12) International Contacts, and 13) Publications. The principal conclusion is that the Turkish economy would benefit from a strengthening of standardization and measurement services. Appropriate recommendations are offered.

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AID; assistance; economics; LDC's (less developed countries); measurement services; standaridzation; survey; Turkey

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